

Recommendations of California's Recycled Water Task Force

California Department of Water Resources

RECYCLED WATER TASK FORCE

WATER RECYCLING 2030

May 2003

Copies of this report are available from:

Department of Water Resources
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LETTER OF TRANSMITTAL BY TASK FORCE TO DEPARTMENT

Thomas Hannigan, Director
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Dear Director Hannigan:

We, the Recycled Water Task Force (Task Force), are pleased to present to you our report entitled “Water Recycling 2030: Recommendations of California’s Recycled Water Task Force.” This report addresses the mission established in Assembly Bill 331 (Goldberg 2001): to evaluate the current framework of State and local rules, regulations, ordinances, and permits to identify the opportunities for and obstacles or disincentives to increasing the safe use of recycled water. The report’s recommendations were arrived at through consensus and represent the members’ commitment to public safety and the need for efficient use of the State’s water resources.

As the Director of the California Department of Water Resources, you understand the need to consider all viable options for augmenting the State’s water supplies. Although we acknowledge that there are additional approaches to meet California’s water requirements, the Task Force was formed to specifically address recycled water issues. We consider recycled water as one important facet of the total solution.

The Task Force, pursuant to your appointments, included 40 members representing federal, State, and local governmental and private sector entities, environmental organizations, and public interest groups, and is a cooperative effort of the California Department of Water Resources, the State Water Resources Control Board, and the Department of Health Services. This report is the culmination of over twelve months of intensive study and consultation by Task Force members, other interested participants, and staff. The Task Force met eight times in four cities in Northern and Southern California. In addition, it sponsored three public discussion sessions and 22 workgroup meetings for further deliberation and public input.

While the Task Force findings are to be presented in a report to the Legislature, the recommendations are not restricted to legislative actions or statutory changes. Many can be implemented by State or local agencies without further legislative authorization or mandate. Some recommendations draw upon the experience of many agencies and provide advice that can be used as a toolbox for communities to improve their planning for recycled water projects.

We give our sincerest thanks for the assistance of the Department of Water Resources, the State Water Resources Control Board, and the Department of Health Services.

In addition to input from industry and government, these recommendations benefited tremendously from the input of the public. Their input helped inform the Task Force’s thinking and the report as a whole. We thank all those who so generously contributed their time and expertise to our report.

We, the Recycled Water Task Force, appreciate the opportunity to transmit this report to you.

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RECYCLED WATER TASK FORCE

WATER RECYCLING 2030:

Recommendations of California's Recycled Water Task Force

May 2003

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Thanks are due to all members of the Task Force and its workgroups for their hard work to fulfill the Task Force objectives. The efforts of DWR, SWRCB, and DHS support staff and their organizational and administrative assistance to the Task Force are greatly appreciated. Special thanks are extended to Dr. Eric Schockman for facilitating the Task Force meetings and to Ms. Luana Kiger, former Chief of DWR Office of Water Use Efficiency, for her input and effort in forming and launching this Task Force.

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EXECUTIVE SUMMARY

To meet the needs of California's projected population of 52 million in the year 2030, the State's water supply must be augmented and made more efficient. Water conservation, recycling, desalination, trading and storage of surface and groundwater are the components that will successfully manage the State's overall water supply.

Since the 1890s, Californians have been reusing municipal wastewater for agriculture and farm irrigation. By the early 1900s, communities began using recycled water (treated wastewater) for landscape irrigation. Currently, California is recycling approximately 500,000 acre-feet of water per year for various uses.

California has the potential to recycle up to 1.5 million acre-feet per year of water by the year 2030. This could free up freshwater supplies to meet approximately 30 percent of the household water needs associated with projected population growth. However, to achieve that potential, Californians will have to invest nearly \$11 billion (approximately \$400 million annually) for additional infrastructure to produce and deliver the recycled water.

The most common recycled water uses include: (1) landscape irrigation of highway medians, golf courses, parks, and schoolyards; (2) industrial uses such as power station cooling towers, oil refinery boiler feed water, carpet dyeing, recycled newspaper processing, and laundries; and (3) agricultural uses such as irrigation of produce, pastures for animal feed, and nursery plant products. Recently, recycled water use has expanded to office buildings for toilet flushing.

In coastal areas, excessive groundwater pumping results in seawater intrusion, which contaminates the aquifers with salt water. Recycled water is used to recharge the aquifers along the coast. This creates a hydraulic barrier to the inflow of seawater, thus protecting the quality and replenishing the supply of the inland groundwater.

Groundwater aquifers have been recharged with recycled water in California since the 1960s. Because groundwater aquifers serve as potable water supply basins, groundwater recharge, including seawater intrusion barriers, is considered an indirect potable reuse. The Department of Health Services (DHS) requires advanced treatment of recycled water before it is used to recharge groundwater aquifers. These treatment requirements are more restrictive than the typical requirements for discharges to inland surface or coastal waters.

Assembly Bill No. 331 was passed by the California Legislature, and signed into law by Governor Gray Davis on October 7, 2001. The bill required the creation of the 2002 Recycled Water Task Force (Task Force) to identify constraints, impediments, and opportunities for the increased use of recycled water and report to the Legislature by July 1, 2003. Although water recycling includes treatment of a broad range of wastewater sources, the Task Force decided to focus on the planned reuse of treated municipal wastewater; specifically, the financial/economic, regulatory, and social issues that typically arise in water recycling projects.

Representatives of federal, State, and local agencies, private entities, environmental organizations, universities, concerned individuals and public-interest groups were appointed to the 40-member Task Force in April 2002. The Task Force includes experts in the field of water recycling, including those involved in the production and use of recycled water, public health officials, world-renowned researchers, environmental organizations, and the public. The Task Force established committees (workgroups) to focus on specific topics of concern and produce reports that served as a basis of Task Force decision-making. The Department of Water Resources (DWR), the State Water Resources Control Board (SWRCB), and the DHS provided technical assistance to the Task Force and its workgroups.

DHS' regulations prescribe the level of treatment necessary for the various uses of recycled water. In general, the public has accepted these regulations as being adequate for protection of public health. There are successful indirect potable reuse projects involving groundwater recharge in California and new projects continue to be proposed. However, in some instances, the public has not been receptive to the concept of using recycled water to recharge groundwater basins that serve as drinking water supply sources. Some indirect potable reuse proposals have been mischaracterized by images of recycled water being fed directly into drinking water pipeline systems. The Task Force found the need to involve the public much earlier in the decision-making process for projects, to make the

process much more transparent and to provide facts early on in project planning. Therefore, the Task Force devoted considerable attention to issues surrounding public health and the need for increased education and outreach related to the facts and scientific research about recycled water.

Other critical issues include the lack of local funding for (1) water recycling infrastructure, (2) research on emerging contaminants, and (3) public health concerns. These have also been identified as impediments to increased water recycling statewide. A financial incentive for the local development of water recycling projects is an effective tool for the construction of water recycling facilities and infrastructure, as evidenced by the SWRCB's Propositions 13 and 50 loan and grant programs. Therefore, the need for additional State funding to provide local water recycling funding assistance is also reflected in the recommendations.

The Task Force identified and adopted 26 issues with respective recommendations to address obstacles, impediments, and opportunities for California to increase its recycled water usage. Recommendations associated with thirteen of these issues were adopted as key recommendations deserving of more immediate attention. The 26 issues and a summary of the recommendations follow. The issues have been numbered as shown in parentheses to correspond to their numbers assigned in Chapters 4, 5, and 6 of the report.

Key Issues and Recommendations Summary:

Funding for Water Recycling Projects (1.1) – State funding for water reuse/recycling facilities and infrastructure should be increased beyond Proposition 50 and other current sources.

Community value-based Decision-making Model for Project Planning (2.1) – Local agencies should engage the public in an active dialogue and participation using a community value-based decision-making model in planning water recycling projects. Public participation activities should go beyond the minimum requirements of State and federal environmental laws, perhaps being reinforced by State funding agencies requiring a comprehensive public participation process as a condition for receiving State funds.

Leadership support for water recycling (2.2) – State government should take a leadership role in encouraging recycled water use and improve consistency of policy within branches of State government. Local agencies should create well-defined recycled water ordinances. Local regulatory agencies should effectively enforce these ordinances. The State should convene an independent statewide review panel on indirect potable reuse to ensure adequate health and safety assurance for California residents.

Educational Curriculum (2.3) – The State should develop comprehensive education curricula for public schools; and institutions of higher education should incorporate recycled water education into their curricula. Governmental and nongovernmental organizations should enhance their existing public education programs.

State-sponsored media campaign (2.4) – The State should develop a water issues information program, including water recycling, for radio, television, print, and other media.

Uniform Plumbing Code Appendix J (3.1) – The State should revise Appendix J of the Uniform Plumbing Code, which addresses plumbing within buildings with both potable and recycled water systems, and adopt a California version that will be enforceable in this State.

DHS Guidance on Cross-connection Control (3.2) – The Department of Health Services should prepare guidance that would clarify the intent and applicability of Title 22, Article 5 of the California Code of Regulations pertaining to dual plumbed systems and amend this article to be consistent with requirements included in a California version of Appendix J that the Task Force is recommending to be adopted.

Health and Safety Regulation (4.1) – The Department of Health Services should involve stakeholders in a review of various factors to identify any needs for enhancing existing local and State health regulation associated with the use of recycled water.

Incidental Runoff (4.2) – The State should investigate, within the current legal framework, alternative approaches to achieve more consistent and less burdensome regulatory mechanisms affecting incidental runoff of recycled water from use sites.

Uniform Interpretation of State Standards (4.3) – The State should create uniform interpretation of State standards in State and local regulatory programs by taking specific steps recommended by the Task Force, for example, appointing an ombudsman in the State Water Resources Control Board to oversee uniformity within the SWRCB and the Regional Water Quality Control Boards.

Water Softeners (4.4) – The Legislature should amend the Health and Safety Code Sections 116775 through 116795 to reduce the restrictions on local ability to impose bans on, or more stringent standards for, residential water softeners. Within the current legal provisions on water softeners, local agencies should consider publicity campaigns to educate consumers regarding the impact of self-regenerative water softeners.

Uniform Analytical Method for Economic Analyses (5.1) – A uniform and economically valid procedural framework should be developed to determine the economic benefits and costs of water recycling projects for use by local, State, and federal agencies. Guidance should be developed to conduct economic feasibility analyses, incorporating nonmarket values to the extent possible. Appropriate benchmarks for comparing incremental costs of developing recycled water with the cost of developing an equivalent amount through alternative measures. An advisory team should be created by the Department of Water Resources, the State Water Resources Control Board, and the Department of Health Services to assist these tasks.

Research Funding (6.1) – The State should expand funding sources to include sustainable State funding for research on recycled water issues.

University Academic Program for Water Recycling (6.2) – The State should encourage an integrated academic program on one or more campuses for water reuse research and education, such as through State research funding.

Additional Important Issues and Recommendations Summary:

Funding Coordination (1.2) – A revised funding procedure should be developed to provide local agencies with assistance in potential State and federal funding opportunities. A Water Recycling Coordination Committee should be established to work with funding agencies, streamlining project selection within individual agencies while ensuring an open process, peer review, and public review.

Regional Planning Criterion (1.3) – State funding agencies should make better use of existing regional planning studies to determine the funding priority of projects. This process would not exclude projects from funding where regional plans do not exist.

Funding Information Outreach (1.4) – Funding agencies should publicize funding availability through workshops, conferences, and the Internet.

Department of Water Resources Technical Assistance (1.5) – Funding sources should be expanded to include sustainable State funding for DWR’s technical assistance and research, including flexibility to work on local and regional planning, emerging issues, and new technology.

Project Performance Analysis (1.6) – Resources should be provided to funding agencies to perform comprehensive analysis of the performance of existing recycled water projects in terms of costs and benefits and recycled water deliveries. An estimate should be performed of future benefits potentially resulting from future investments.

Recycled Water Symbol Code Change (3.3) – The Department of Housing and Community Development should submit a code change to remove the requirement for the skull and crossbones symbol in Sections 601.2.2 and 601.2.3 of the California Plumbing Code.

Stakeholder Review of Proposed Cross-connection Control Regulations (3.4) – Stakeholders are encouraged to review Department of Health Services draft changes to Title 17 of the Code of Regulations pertaining to cross-connections between potable and nonpotable water systems.

Cross-connection Risk Assessment (3.5) – The Department of Health Services should support a thorough assessment of the risk associated with cross-connections between disinfected tertiary recycled water and potable water.

Permitting Procedures (4.5) – Various measures should be conducted to improve the administration and compliance with local and State permits, including providing Department of Health Services guidance, dissemination of information by the Association of California Water Agencies and the California Association of Sanitation Agencies, and State and local tax incentives to offset costs of compliance with regulations.

Source Control (4.6) – Local agencies should maintain strong source control programs and increase public awareness of their importance in reducing pollution and ensuring a safe recycled water supply.

Economic Analyses (5.2) – Local agencies are encouraged to perform economic analyses in addition to financial analyses for water recycling projects to provide transparency regarding the true costs and benefits of projects. State and federal agencies should require economic and financial feasibility as two funding criteria in their funding programs.

Statewide Science-based Panel on Indirect Potable Reuse (6.3) – As required by AB 331, the Task Force reviewed the 1996 report of the California Indirect Potable Reuse Committee and other related advisory panel reports and concluded that reconvening this committee would not be worthwhile at this time.

Details concerning the recommendations are contained in the report.

The Task Force intends for this report to be used as a working tool to guide the Legislature, State government, public agencies, the public and all water recycling stakeholders towards the safe and successful expansion of recycled water use to help meet the State's future water supply needs.

Water Recycling 2030

Recommendations of California's Recycled Water Task Force

Chapter 1

Introduction

Adequate water resources are essential not only for basic human sustenance but also for a thriving economy that supports a high standard of living and amenities that make California a great place to live. Many areas of California are arid to semi-arid, requiring careful use of water and expensive water projects to maintain adequate supplies. Reusing treated municipal wastewater has long been practiced as one way to make efficient use of our water resources.

There are a variety of technical, health, and social issues that arise in the planning, development, regulation, and operation of water recycling projects. Through access to adequate information, sound planning and engineering practices, and appropriate regulatory standards and practices, there may be improved ability to implement successful projects that will contribute to the State's water supply and protect public health. The Recycled Water Task Force was created with the general mission of identifying ways to improve our ability to cope with these issues and making recommendations for specific actions that can be taken. This report is the product of the Task Force.

This chapter includes an overview of the Task Force and the process used to arrive at its recommendations. Chapter 2 includes an estimate of the potential for additional recycled water use in California, how it can complement our water supply, and the potential cost. The legal and regulatory framework for water recycling in California is presented in Chapter 3. The issues that have been identified by the Task Force are described in Chapter 4, and the highest priority recommendations to address these issues are presented. The remaining recommendations of the Task Force are included in Chapter 5. Implementation of the recommendations is addressed in Chapter 6.

Appendices are added as reference material, including a copy of Assembly Bill No. 331, a glossary, and abbreviations used in this report. White papers were prepared by six Task Force workgroups to provide a detailed analysis of the issues to assist the Task Force in developing its recommendations. While these white papers have not been adopted by the Task Force, they will be published separately as background information.

It will be helpful if some key terms are defined. "*Recycled water*" is defined in the California Water Code to mean "*water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.*" For the present purposes we can simplify this to mean wastewater that has been treated to a quality that is suitable to use the water again. This could include both agricultural return waters and municipal wastewater; however, it appears that the legislative intent of the Task Force is to focus on the reuse of treated municipal wastewater. "Reclaimed water" and "reclaimed wastewater" are other terms in common use equivalent to recycled water.

In recent years "water recycling" has come to be an umbrella term encompassing the process of treating wastewater, storing and distributing the recycled water, and the actual use of the recycled water. "Water reclamation" and "wastewater reclamation and reuse" are other equivalent terms. In 1995, provisions of the Water Code, Fish and Game Code, Health and Safety Code, and other statutes were amended to replace terms such as wastewater "reclamation" and "reclaimed water" with "water recycling" and "recycled water." This legislation was intended to enhance public acceptance of recycled water supplies.

Recycled Water Task Force

The creation of the Recycled Water Task Force was called for in Assembly Bill No. 331 (Goldberg), which was passed by the California Legislature and approved by Governor Davis on October 7, 2001 (Water Code Section 13578). The text of the bill is in Appendix A. As directed in the bill, the Task Force was convened by the California Department of Water Resources (DWR). However, the Task Force has functioned as a cooperative effort of the three State agencies primarily responsible for planning and regulating water supply, including the State Water Resources Control Board (SWRCB) and the Department of Health Services (DHS). The Task Force is chaired by the SWRCB Member Richard Katz. The general objective of the Task Force is to advise DWR and report to the Legislature by identifying the opportunities for increasing the use of recycled water and identifying the constraints and impediments to increasing the use of recycled water. The Task Force must report to the Legislature no later than July 1, 2003.

The Task Force is composed of 40 members representing federal, State, and local governmental and private sector entities, environmental organizations, University of California, and public interest groups. The Task Force is composed of experts on the safe and beneficial uses of recycled water, including producers, suppliers, and users of recycled water, regulators, and representatives from environmental organizations, industry, and the public. The composition of the Task Force includes categories specified in AB 331 as well as additional members included to represent a broad range of viewpoints and expertise. The numbers of members representing various categories are listed below:

- 12 – State and federal government
- 2 – County health officials
- 14 – Local public agencies (water, wastewater, water recycling)
- 3 – Agency and industry associations
- 1 – University of California
- 4 – Public interest organizations and the public
- 2 – Private industry
- 2 – Investor-owned water utilities

In addition, over 40 people assisted the Task Force as staff and members of various workgroups of the Task Force. The names of the Task Force and workgroup members and staff are listed at the beginning of the report.

The first meeting of the Task Force was held on April 3, 2002. Its eighth and final meeting was held on May 13, 2003.

To accomplish the Task Force mission, six workgroups were created to address specific issue areas in depth and to report back to the Task Force. Twenty-two meetings were held by these workgroups.

A Web site was created for the Task Force to provide public access to its work and schedule. All meetings of the Task Force and workgroups were publicly noticed and open for public participation. In addition, three public discussion sessions were held.

Focus of Task Force

As a rationale for the work of the Task Force, AB 331 cites two goals set forth in other documents. The first is a statewide goal to recycle a total of 700,000 acre-feet of water per year by the year 2000 and 1,000,000 acre-feet of water per year by the year 2010 (Section 13577, Water Code). The second is a recommendation of Governor Davis' Advisory Drought Planning Panel (Panel) Critical Water Shortage Contingency Plan. That recommendation is, "In the interest of implementing the CALFED water use efficiency program (water conservation and water recycling actions) as quickly as possible, the Panel recommends that DWR maximize use of grants, rather than capitalization loans, to bring local agencies up to the base level of efficiency contemplated in the CALFED Record of Decision. The Panel recognizes that this recommendation would correspondingly accelerate the need for an additional source of State financial assistance for the water use efficiency program."

To address these goals, the Task Force is required by AB 331 to identify and report to the Legislature on opportunities for increasing the use of recycled water. It also must identify constraints and impediments, including the level of State financial assistance available for project construction. The bill further specified six areas for investigation:

1. How to further the use of recycled water in industrial and commercial applications, including the applicability of various requirements for prevention of cross-connections between potable and nonpotable water systems.
2. Changes in the Uniform Plumbing Code that are appropriate to facilitate the use of recycled water in industrial and commercial settings and recommendations to the California Building Standards Commission to effect those changes.
3. Changes in State statutes or the current regulatory framework at the State and local level that are appropriate to increase the use of recycled water for commercial laundries and toilet and urinal flushing in structures and financial incentives to help offset the cost of retrofitting structures.
4. The need to reconvene the California Potable Reuse Committee established by DWR in 1993 or to convene a successor committee to update the committee's finding that planned indirect potable reuse of recycled water by augmentation of surface water supplies would not adversely affect drinking water quality if certain conditions were met.
5. The need to augment State water supplies using water use efficiency strategies identified in the CALFED Bay-Delta Program, including ways to coordinate with CALFED to assist local communities in educating the public with regard to the statewide water supply benefits of local recycling projects and the level of public health protection ensured by compliance with State health standards.
6. Impediments or constraints, other than water rights, related to increasing the use of recycled water in applications for agricultural, environmental, or irrigation uses.

While the report is to be delivered to the Legislature, the Task Force is not confined to recommendations requiring legislative action. The Task Force has investigated actions that can be taken at all levels of government, as well as by nongovernmental organizations.

Workgroups

Early in the deliberations of the Task Force over 85 issues were suggested for investigation. It was necessary to create workgroups to be able to do the fact-finding and deliberate on potential alternative recommendations to bring to the Task Force for its consideration. The workgroups provided an opportunity for focused discussion not only by interested Task Force members but also by persons outside of the Task Force having special interests and expertise.

Six issue areas were established for focus by workgroups:

1. Funding / CALFED coordination
2. Public information, education, and outreach
3. Plumbing code / cross-connection control
4. Regulations and permitting
5. Economics of water recycling
6. Science and health / indirect potable reuse

Each workgroup was given a charge by the Task Force related to its issue area. The workgroups were intended to review all of the issues raised within their issue areas, select priority issues for in-depth analysis, and make recommendations to address the priority issues. The workgroups narrowed the list of potential issues to a few that appeared to be of highest priority so that within the limited time frame of the Task Force sufficient background information could be gathered to develop meaningful recommendations. The workgroups drafted "white papers," which contain the background information, issue analysis, and workgroup recommendations to the Task Force. The white papers were the foundation for further deliberation by the Task Force members but were not adopted by the Task Force. In addition, the workgroups provided expert presentations to the Task Force. The white papers will be published separately and will be available to the public.

Chapter 2

Role and Potential of Water Recycling

California's current population of 35 million is expected to grow by roughly 17 million by 2030, a 50 percent increase. To meet the water demands associated with this growth, it will be necessary to develop a balanced portfolio of water resources, not only the traditional storage projects, but also an array of other types of facilities and management techniques, such as water transfers, water conservation, desalination, and, most certainly, water recycling. Based on the potential for additional recycled water use developed later in this chapter, recycled water could free up enough fresh water to meet the household water demands of 30 to 50 percent of the additional 17 million Californians. To achieve this potential, an investment of \$11 billion would be needed.

Recycled Water Use in California

Water recycling has been taking place in California as early as 1890 for agriculture, although it is likely that the wastewater was untreated at that time. By 1910 at least 35 communities were using wastewater for farm irrigation, 11 without wastewater treatment and 24 after septic tank treatment. Landscape irrigation in Golden Gate Park in San Francisco began with raw sewage, but due to complaints, minimal treatment was added in 1912. Since then wastewater treatment standards have been greatly improved to protect public health.

By 1952 there were 107 communities using recycled water for agricultural and landscape irrigation. The first comprehensive statewide estimate of water reuse of municipal wastewater was made in 1970, when 175 thousand acre-feet of recycled water were used. In 2000, this amount had increased to 402 thousand acre-feet. The recycled water was supplied by 234 wastewater treatment plants and delivered to over 4,800 sites. Currently recycled water use is estimated to be within a range of 450 to 580 thousand acre-feet per year. The trend in use is illustrated in Figure 1.

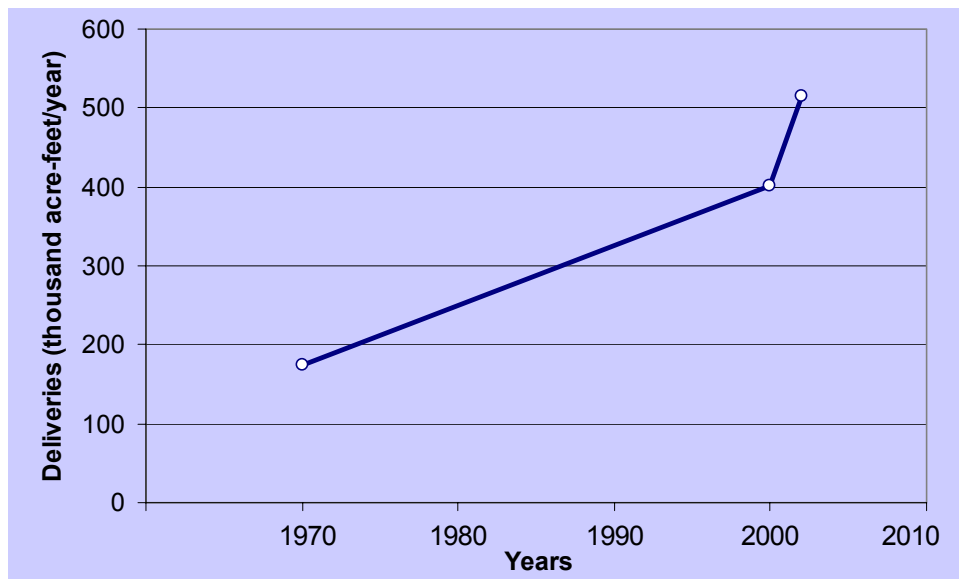


Figure 1. Recycled Water Use in California for 1970 to 2002 (thousand acre-feet/year).

Recycled water is being used in a variety of ways, as illustrated in Figure 2. At least 20 varieties of food crops are grown with recycled water, including vegetables eaten raw, such as lettuce and celery. Eleven non-food crops, especially pasture and feed for animals, as well as nursery products, are irrigated with recycled water. Landscape irrigation is primarily for turf, including over 125 golf courses and many parks, schoolyards and freeway landscaping. Industrial and commercial uses include cooling towers in power stations, boiler feed water in oil refineries, carpet dyeing, recycled newspaper processing, and laundries. Recycled water is being used in office buildings for toilet and urinal flushing.

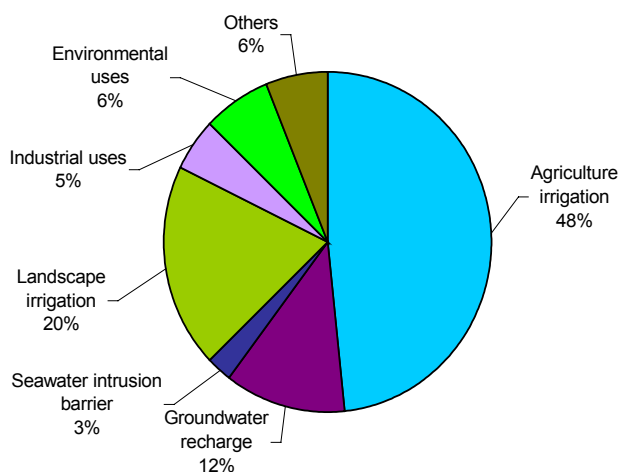


Figure 2. Types of Recycled Water Use in California (SWRCB, 2000)

In many groundwater basins in California, the rate of pumping exceeds the rate of natural replenishment. Artificial recharge of groundwater is practiced in some areas by percolating either stormwater captured from streams, imported water, or recycled water into aquifers. The most notable use of recycled water for this purpose is recharge in the Montebello Forebay Groundwater Project in the vicinity of Whittier, which has occurred since 1962. In coastal areas where excessive groundwater pumping has taken place, the groundwater levels have fallen to the extent that seawater has been drawn inland, contaminating aquifers. Recycled water has been injected into the aquifers along the coast to create barriers to the seawater, thus protecting the groundwater while, in part, also replenishing the aquifer. Highly treated recycled water has been injected into a seawater barrier in Orange County since 1976 and a newer project operates along the coast in Los Angeles County.

Water Recycling Fundamentals

Projects are initiated to serve particular objectives. Use of recycled water is motivated with a particular objective in mind and is often evaluated as one of several alternatives before determining that recycled water use is the most cost-effective means of meeting one or more objectives. There are several objectives that have led to the use of recycled water in California:

1. An incidental secondary benefit to the disposal of wastewater, primarily crop production by irrigation with effluent
2. A water supply to displace the need for other sources of water
3. A cost-effective means of environmentally sound treatment and disposal of wastewater
4. A water supply for environmental enhancement.

Historically, agricultural use of recycled water predominated in California and occurred mostly in the Central Valley, where farm land was located adjacent to wastewater treatment facilities. The farm land offered a convenient

place for disposal of effluent, and sometimes the sale of recycled water to nearby farmers offered a source of income to reduce costs to sewer users even when facilities were available for discharge to surface waters. As treatment standards were raised to protect the environment, land application was looked at more seriously as a cost-effective means of treatment and disposal of wastewater as opposed to discharge into streams. However, in recent decades, the emphasis in promoting water reuse has been more on the water supply benefits to meet demands in water-short areas. Water recycling is evaluated in comparison with other means of enhancing water supplies. Most projects now occur in urban areas, and uses have shifted more toward urban uses, such as landscape irrigation and industrial use. Environmental enhancement, such as wetlands restoration, can be another, but certainly less prevalent, motivation.

Aside from meeting one or more of the major project objectives described above, there can be potential secondary benefits:

1. Provide additional reliable local sources of water, nutrients, and organic matter for agricultural soil conditioning and reduction in fertilizer use
2. Reduce the discharge of pollutants to water bodies, beyond levels prescribed by regulations, and allow more natural treatment by land application
3. Provide a more secure water supply during drought periods.
4. Provide economic benefits resulting from a more secure water supply.

The degree and type of wastewater treatment that is provided to make recycled water suitable for use depends on the types of use, the potential exposure of humans to recycled water and the public health implications, and the water quality required beyond health considerations. The basic levels of treatment include primary, secondary, and tertiary. Not all wastewater receives all three levels of treatment. Secondary treatment is commonly the minimum level of treatment for discharge to surface waters and for many uses of recycled water. Tertiary treatment is sometimes required for discharge to surface waters to protect fisheries or protect some uses of the waters. Tertiary treatment is often required for recycled water where there is a high degree of human contact. Disinfection is usually required for either discharge or recycled water use to kill viruses and bacteria that can cause illness.

The Department of Health Services specifies the levels of treatment for recycled water and publishes the standards in Title 22 of the California Code of Regulations. Examples of types of use and the prescribed levels of treatment are shown in Table 1. Beyond the treatment required for health protection, certain uses have specific water quality needs. High sodium or boron in water can be harmful to crops. Water hardness can cause scaling in industrial boilers. Nitrogen and phosphorus can stimulate algal growth in ponds or cooling towers. Sometimes specialized forms of tertiary treatment are needed to remove specific chemicals that would make recycled water unusable.

Most recycled water projects are designed to provide one level of water quality to all customers connected to the recycled water distribution system. If only a few potential customers need a special quality of water, it may not be economical to treat all of the recycled water to meet these special quality requirements. In recent years a more innovative approach is being practiced. Some customers with special quality needs may be served by their own pipeline from the wastewater treatment plant, and the recycled water producer provides two or more qualities of recycled water. If a single customer has special needs, the standard quality of recycled water is delivered to the customer's site and a customized treatment facility at the site provides the added treatment to bring the quality up to the standards of the customer. West Basin Municipal Water District in Southern California has been a leader in this concept, serving several oil refineries and a seawater barrier with five qualities of water in addition to disinfected tertiary recycled water suitable for landscape irrigation. Customized treatment either at the central wastewater treatment plant or at customer sites is one possibility to add flexibility to add more customers at an acceptable cost.

Treated wastewater is reused in many areas of the State even when no projects have been constructed with this intent. For example, about 90 percent of municipal wastewater discharged in the San Joaquin Valley is reused. A discharge into a river becomes part of the river flow that may be diverted downstream for farms or other cities. This indirect reuse, that is, reuse after treated wastewater has passed through a natural body of water, is illustrated in Figure 3. A groundwater aquifer can also be the natural body for indirect reuse. Recycled water can be injected in wells or percolated from ponds and become a part of the groundwater supply that is later pumped out for use. Water that is retained in streams and wetlands maintains aquatic environments and scenic values. This "environmental water" is another unplanned benefit of indirect reuse of treated wastewater that is discharged into water bodies.

Table 1. Examples of Minimum Treatment Levels to Protect Public Health

Types of Use	Treatment Level		
	Disinfected Tertiary	Disinfected Secondary	Undisinfected Secondary
Urban Uses and Landscape Irrigation			
Fire protection	☑		
Toilet & Urinal Flushing	☑		
Irrigation of Parks, Schoolyards, Residential Landscaping	☑		
Irrigation of Cemeteries, Highway Landscaping		☑	
Irrigation of Nurseries		☑	
Landscape Impoundment	☑	☑*	
Agricultural Irrigation			
Pasture for milch animals		☑	
Fodder and Fiber Crops			☑
Orchards (no contact between fruit and recycled water)			☑
Vineyards (no contact between fruit and recycled water)	☑		☑
Non-Food Bearing Trees			☑
Food Crops Eaten After Processing		☑	
Food Crops Eaten Raw	☑		
Commercial/Industrial			
Cooling & Air Conditioning - w/cooling towers	☑	☑*	
Structural Fire Fighting	☑		
Commercial Car Washes	☑		
Commercial Laundries	☑		
Artificial Snow Making	☑		
Soil Compaction, Concrete Mixing		☑	
Environmental and other Uses			
Recreational Ponds with Body Contact (Swimming)	☑		
Wildlife Habitat/Wetland		☑	
Aquaculture	☑	☑*	
Groundwater Recharge			
Seawater intrusion Barrier	☑*		
Replenishment of potable aquifers	☑*		
* Restrictions may apply			

Most indirect reuse is unplanned, that is, there was no prearranged agreement or intention that the producer of the treated wastewater would maintain control of the effluent after discharge so that it would be reused downstream. The downstream reuse is an incidental result of effluent disposal by discharge and withdrawal downstream of river water. When such indirect reuse could occur, the wastewater discharge is regulated to protect the public health for the downstream beneficial use. Planned reuse typically involves direct reuse by delivering recycled water directly through pipes to the users of the water. Examples of direct reuse are also illustrated in Figure 3.

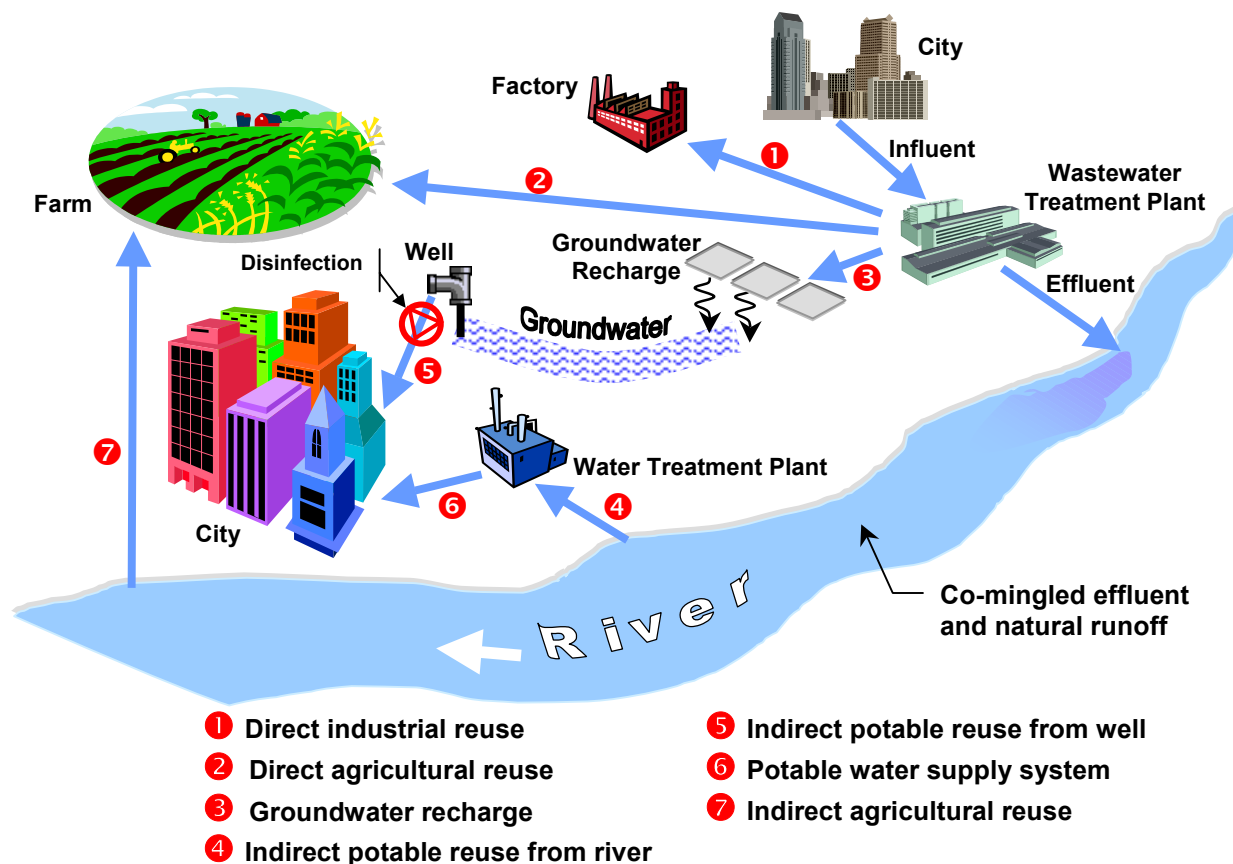


Figure 3. Direct and Indirect Recycled Water Use

These concepts of direct and indirect reuse and planned and unplanned reuse are important in understanding the discussion of public health issues and public acceptance concerns regarding water recycling. They are also important in interpreting data on water reuse, which are not consistent in indicating whether they include only planned or only direct reuse.

Furthermore, unplanned indirect reuse already makes a vital contribution to the State's water supply. In terms of making the greatest impact on augmenting the State's water supply, emphasis should be placed on reusing recycled water that has no opportunity to be reused downstream, for example, discharges directly to the ocean. This understanding may affect the priority of the State's efforts in encouraging new water recycling projects. In terms of statewide water resources planning, DWR recognizes this distinction by classifying water recycling projects in coastal and some other areas as "new water supplies" because they offset the need for other new supplies rather than offsetting downstream reuse that already may occur.

Research surveys conducted to evaluate public acceptance of recycled water have confirmed the intuitive expectation—the more direct and frequent the human contact with the recycled water, the more concern of the public, mainly related to public safety perceptions. While direct human ingestion has been proposed and researched, recycled water even with highly sophisticated treatment technologies has never been publicly accepted for direct potable use in the United States. With few exceptions nonpotable uses, including some uses with high potential for human contact, such as golf courses or schoolyards, have achieved widespread public acceptance. Public health is a concern for any type of reuse, but public health officials and experts have been able to define levels of wastewater treatment and recycled water use practices that will minimize human contact and reduce the potential for infection or other disease to indiscernible background levels.

While direct potable reuse is not practiced, forms of indirect potable reuse have taken place in California and have been proposed. The Task Force did find a widely divergent acceptance of these indirect potable reuse concepts. Groundwater recharge by replenishing groundwater aquifers with recycled water has been practiced in California since 1962 in the form of percolation from ponds through soil before reaching the groundwater and since the 1970s in the form of direct injection of advanced treated recycled water into aquifers. Because the aquifers serve as a potable water supply through wells, recharge is a form of indirect potable reuse. Various forms of tertiary wastewater treatment are provided before the recycled water is allowed to reach the aquifer. These levels of treatment are higher than would generally be required for discharges to a typical stream or the ocean. There are also natural mechanisms in the soil that provide treatment of any water that percolates down. As with all uses of recycled water, a strong governmental structure regulates the types of treatment necessary to protect public health, and generally the public has accepted the judgment of the public health authorities. However, in some communities public concern has halted the implementation of indirect potable reuse projects. The Task Force focused considerable attention to public acceptance and health issues and made recommendations to address these.

Water Recycling Potential

Estimating the future potential of recycled water use is an uncertain task. Water planners will be continually evaluating a variety of alternative water sources to determine the most cost-effective and feasible options at the time. While there are increasing public health concerns not only with respect to recycled water but also with all of our sources of water, technology is becoming more effective to cope with some chemicals of concern. Technology is evolving that will make recycled water treatment, as well as alternative sources, such as desalination, more economical. As with conventional water sources, most of the cheapest opportunities to exploit recycled water have already been undertaken. It is difficult to predict exactly how recycled water will compare with alternative supply options in the long term.

Nevertheless, some studies have been conducted to estimate future potential. The most comprehensive were two regional studies covering the metropolitan areas of the Southern California coastal region and the San Francisco Bay Area. In addition, surveys have been conducted to poll agencies regarding the potential projects within their service areas. Another point of reference is the total amount of municipal wastewater that is produced or projected to occur. The amount of treated municipal wastewater produced currently in California is estimated to be about 5 million acre-feet per year. With recycled water use currently at a level of approximately 500 thousand acre-feet per year, about 10 percent of available treated effluent was reused in planned water recycling projects. California's current population of 35 million is expected to increase by 3.5 million by 2007 to 38.5 million. By 2030, the population is projected to reach 52 million, a 17 million (50 percent) increase over current population. By 2030, the amount of wastewater available for water recycling projects is estimated to increase to about 6.5 million acre-feet per year.

With these studies and projections of available wastewater as a foundation and the caveats of uncertainty, projections for recycled water use are presented in Table 2 and shown in Figure 4 in the form of ranges. In 2030, the midrange amount of projected increase in recycled water use is about 1.5 million acre-feet per year, which would be about 23 percent of the available municipal wastewater. Because of the special public health concerns that have been raised regarding indirect potable reuse, nonpotable and planned indirect potable uses have been separated in the table. Planned indirect potable uses include groundwater recharge, a portion of seawater intrusion barriers and surface reservoir augmentation for potable supply.

As was discussed earlier, many inland discharges of treated wastewater are indirectly used downstream. Thus, not all of the projected additional recycled water use is considered new water that augments the State's water supply. However, with most of the urban demand occurring in coastal areas where discharges pass through to the ocean or saline bays, it is estimated that 1.2 million acre-feet of new water will be yielded with recycled water use by 2030. When compared to the household use of the additional 17 million Californians, this new water could substitute for enough fresh water to meet the household water demands of 30 to 50 percent of the household water demand.

Table 2. Estimated Existing and Projected Potential Use of Recycled Water in California (taf/year)

<i>Year</i>	<i>2002</i>	<i>2007</i>	<i>2010</i>	<i>2030</i>
<i>Planned non-potable use</i>	400-510	520-740	770-1,000	1,520-1,850
<i>Planned indirect potable use</i>	50-70	80-120	120-170	330-400
<i>Total</i>	450-580	600-860	890-1,170	1,850-2,250
<i>Increase beyond 2002</i>		150-280	440-590	1,400-1,670

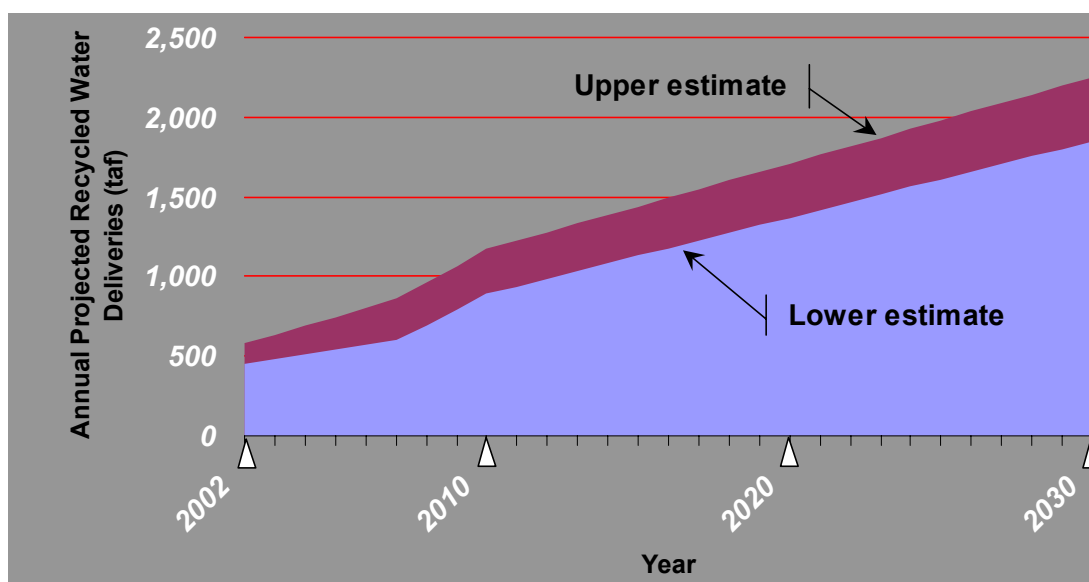


Figure 4. Projection of Recycled Water Deliveries in California through 2030

As with many water supply options facing California to maintain adequate future water supplies, considerable capital investment will be required for water recycling facilities. As with surface water storage, conjunctive use and ocean desalination projects, for example, funds for design and construction of recycled water projects must be raised at the outset of a project even though revenue to pay the debt will become available over many years of project operation.

A variety of factors can affect costs of recycled water projects, including types of use, the degree of wastewater treatment required, and the distance to deliver the recycled water. The cost to build the capacity to treat and deliver one acre-foot of recycled water annually can vary significantly. When capital costs and other factors are annualized over the life of a project, individual projects can vary from practically no extra cost to treat and deliver recycled water to over \$2,000 per acre-foot of delivered water, including capital and operational costs. It should be noted that average unit costs have been estimated to be about \$600 per acre-foot. These costs are generally comparable to other water supply options, for example, new dams and reservoirs or desalination.

Fortunately, most projects will cost well below the upper limit. Utilizing the studies referred to above, an average cost to build the capacity to yield one acre-foot per year was assumed to be \$6,500 for nonpotable reuse projects and \$6,800 for indirect potable reuse projects. The increased cost for indirect potable reuse may be due to higher levels of treatment and reliability features. Applying these unit costs to the projections in Table 1, the ranges of aggregate capital costs were estimated, as shown in Table 2.

To add 1.40 to 1.67 million acre-feet per year of recycled water by 2030, an estimated capital investment of between \$9 billion to \$11 billion will be required between now and 2030, as shown in Table 3. The cumulative investment over time is shown in Figure 5. A State bond issue, Proposition 50, was passed by voters in 2002, which included funds for water recycling projects. These funds are anticipated to take until 2005 to allocate. The average additional funds that will be needed after 2005 until 2030 are between \$360 to 430 million per year. (Note that all costs are expressed in year 2000 dollars.)

It is important to note that water recycling projects can meet water quality needs by reducing wastewater flows into the environment, increasing water that can be available to endangered species habitat, conserving energy, or achieving other needs or goals. Thus, the investment in water recycling may yield benefits beyond just meeting water supply needs.

Table 3. Total Capital Cost Estimates to Augment Recycled Water Supplies, Million dollars

<i>Years</i>	<i>2003-2007</i>		<i>2008-2010</i>		<i>2011-2030</i>	
<i>Range</i>	Low	High	Low	High	Low	High
<i>Non-potable use</i>	780	1,495	1,625	1,690	4,875	5,525
<i>Indirect planned potable use</i>	205	344	273	341	1,433	1,570
<i>Cumulative cost beyond 2002</i>	985	1,839	2,883	3,870	9,191	10,965

Note: Calculations based on USBR, Southern California Comprehensive Water Reclamation and Reuse Study, September 2000 draft. (Dollars expressed in year 2000 values)

Water recycling projects are generally constructed and operated by local agencies. Operation and maintenance costs are incurred after the projects are constructed. These costs also vary widely. One sampling of proposed projects had estimated operation and maintenance costs in the range of \$70 to 490 per acre-foot, with an average of \$300 per acre-foot.

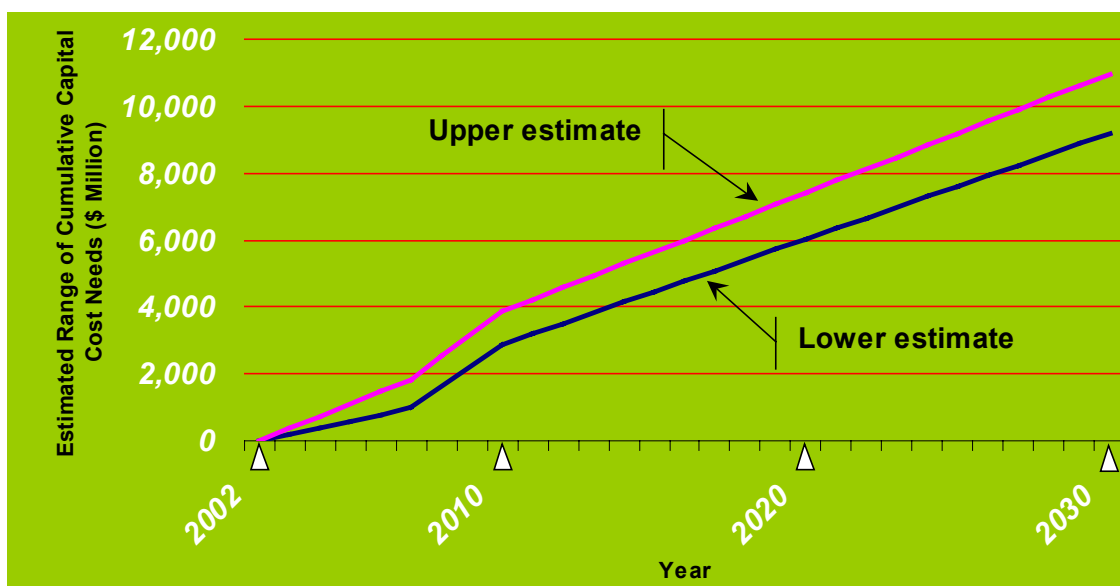


Figure 5. Cumulative Capital Investment in Water Recycling through 2030 in California

The capital and operation and maintenance costs are recovered mainly through revenues from discharges into sewers, users of recycled water, and potable water customers who share the benefits of the added local supply of water. Freshwater projects are generally self-sustaining, but there is precedent for State or federal subsidy of water projects when particular projects have financial difficulty and there are social, economic, or environmental goals transcending a local project. Because water recycling projects are often more expensive than other local water supplies, the State and federal government have been providing subsidies for capital costs. In addition, some regional water agencies have provided annual subsidies to local agencies based on recycled water deliveries. The State funding has been in the form of low interest loans or partial grants for planning, design, and construction of projects. The sources of these funds have been bond issues, the last of which was Proposition 50 in 2002. The federal funds have been appropriations for partial grants to local agencies for design and construction. The Task Force has recommendations in Chapter 4 regarding additional funding.

Chapter 3

Legal and Regulatory Framework for Water Recycling

Water recycling is accomplished in California with the involvement of many entities at all levels of government and in some cases investor-owned utilities. Water supply and wastewater districts are primarily responsible for the planning, design, and implementation of the over 200 projects operating in the State. The SWRCB and the U.S. Bureau of Reclamation have played major roles in providing capital funding for local projects. Several large regional wholesale water agencies, for example, the Metropolitan Water District of Southern California and the San Diego County Water Authority, have also provided significant financial assistance to local agencies. DWR and CALFED have incorporated water recycling in the water supply planning for the State. DWR has provided planning assistance in regional studies and a coordination and promotional role in facilitating water recycling.

Regulation of water recycling is vested by State law in SWRCB and Department of Health Services (DHS). Permits are issued to each water recycling project by one of the nine Regional Water Quality Control Boards (RWQCB) that are part of the SWRCB. These permits include water quality protections as well as public health protections by incorporating criteria established by DHS. The criteria issued by DHS are found in Title 22 of the California Code of Regulations. DHS does not have enforcement authority for the Title 22 criteria; the RWQCBs enforce them through enforcement of their permits containing the applicable criteria. To protect public drinking water supplies, DHS also has regulations to prevent cross connections between recycled water systems and potable water systems. Local health departments and DHS have enforcement authority over these cross connection prevention regulations.

The applicability of the California Plumbing Code (California Code of Regulations, Title 24, Part 5) to various types of buildings and types of plumbing depends on the authorities of various State agencies that govern State-owned buildings, residential occupancies, medical facilities, schools and other occupancies. For example, the Department of Housing and Community Development (HCD) makes adoptions in the California Plumbing Code, which is based on the Uniform Plumbing Code with California amendments, for applicability to multi- and single-family residential occupancies. The California Building Standards Commission reviews proposed amendments to the California Building Standards Code (California Code of Regulations, Title 24), such as HCD's, and approves them for publication.

There are lesser roles for other agencies and other applicable laws that become important in specific instances. The 1996 "Memorandum of Agreement between the Department of Health Services and the State Water Resources Control Board on Use of Reclaimed Water" provides a good description of the regulatory roles and joint responsibilities of these two agencies. This document is in Appendix B. The most pertinent laws and regulations applicable to recycled water are found in California State codes and the California Code of Regulations. Most of these are provided in Appendix C.

Chapter 4

Issue Areas and Key Recommendations

The issues, potential constraints, and impediments regarding water recycling were grouped by the Task Force into six issue areas. The six workgroups investigating the issues within each area brought recommendations to the Task Force for further deliberation and revision. Within the issue areas, 26 separate issues were identified, 13 of which were deemed to be of highest priority. The Task Force adopted recommendations for all 26 issues, in some cases adopting more than one recommendation for an issue. The six issue areas and the scope of problems included within them are described in this chapter. Also, the highest priority issues and their key recommendations are presented here. In the following chapter the remaining issues and associated recommendations are presented. The six issue areas are as follows:

1. Funding for water recycling
2. Public dialogue / Public outreach
3. Plumbing code / Cross-connection control
4. Regulations and permitting
5. Economics of water recycling
6. Science and health / Indirect potable reuse

At the outset the Task Force emphasizes that while it has investigated ways to promote and increase the use of recycled water, the recommendations presented in this report are not intended to compromise in any way the health and safety of the public. California has a strong record of safe use of recycled water. It is only by continuing this foundation can we maintain public confidence and support and move forward.

The recommendations are given unique numbers for reference, for example, 2.1.3. The first number relates to the issue area, the second to the issue, and the third to the recommendation itself.

1. Funding for Water Recycling

Various State and federal agencies within California administer funding programs to provide financial assistance for public water recycling projects. Typically, local agencies apply for funding for such projects from programs administered by the SWRCB, the DWR, and the USBR. The SWRCB and DWR funding programs operate within the State CALFED funding umbrella.

Each State and federal funding program has a different application process and no requirements exist for the agencies to coordinate their funding efforts. Having such variation in funding is beneficial if it results in more funding for water recycling, thereby serving the different water recycling projects statewide. However, the varying processes can be cumbersome to local applicants seeking funding from multiple sources. Greater water recycling benefits can be achieved with coordination among agencies that serve as funding sources for water recycling research, studies, and projects.

1.1. Funding for Water Recycling Projects

Issue

The current level of allocated funding for water recycling projects falls short of fulfilling the water recycling potential described in Chapter 2. A total of about \$11 billion for capital costs will be needed by 2030 to add an additional 1.5 million acre-feet per year of recycled water capacity in California.

Recommendation 1.1.1. State funding for reuse/recycling should be increased beyond Proposition 50 and other current sources. Funding for construction of recycled water projects should be included in future water bonds. Under the existing cost share, the State needs to include in new bonds on the order of \$300 million annually for grants and low interest loans to achieve the 1.5 million acre feet of additional recycling by the year 2030.

Approach and Implementation: A bond issue should be passed by the Legislature to allocate additional funding for water recycling projects. Funds for planning, design, and construction of projects should be administered by the SWRCB. Time frame: July-December 2003.

Previous State bond issues have provided funds for the planning, design, and construction of water recycling projects and for research. Under the current rules, planning grants are provided up to \$75,000 per study with a 50 percent local match requirement. For design and construction funding, both grants and loans are available. Grants are provided for 25 percent of capital cost up to a maximum of \$5 million per project. The remainder of capital costs can be funded with State loans at a subsidized interest rate of one half of the interest rate of State bonds. The combined grant and loan for a project provide an equivalent subsidy of about 40 to 45 percent of capital costs. Federal funding can be used by a project to the extent that the combined State and federal funding does not exceed 45 percent, thus ensuring a significant local investment. It is recommended to continue this State funding framework with additional funds.

Recommendation 1.1.2. The California Water Commission, in cooperation with DWR and SWRCB, is strongly encouraged to seek federal cost sharing legislation to support the development of water recycling projects in California to achieve the 1.5 million acre-feet goal by the year 2030.

Approach and Implementation: The U.S. Congress should be requested to continue to support federal funding and activities for water recycling. The federal government has provided significant capital funding for water recycling projects in California under the Reclamation Wastewater and Groundwater Study and Facilities Act (Title XVI of Public Law 102-575). The U.S. Bureau of Reclamation has also conducted the Southern California Comprehensive Water Reclamation and Reuse Study and assisted in the San Francisco Bay Area Regional Water Recycling Program master plan, regional studies identifying opportunities for water recycling in Southern and Northern California and evaluating potential projects to expand water reuse.

2. Public Dialogue / Public Education and Outreach

While the direct participants in water recycling are the water and wastewater agencies that plan, design, construct and operate recycled water facilities and the users of the recycled water, the impacts of water recycling projects extend to the public at large. The public bears part or all of the financial burden, experiences possible exposure to recycled water, and may experience aesthetic or other impacts of projects. Public concerns over cost and public health have been the most prominent, but underlying issues of environmental justice or growth and land development have been evident.

Public support for water recycling has generally been very strong and many projects have been implemented without the apparent need for significant public participation. However, perhaps due to a more astute public awareness of public works projects or more concern over public health issues, several water recycling projects in recent years have experienced enough public opposition to halt their implementation. Controversy has focused mainly on indirect potable reuse projects, where the end product of the recycled water becomes part of drinking water sources, either groundwater basins or surface water reservoirs. One major conclusion of the Task Force is that the decision to undertake indirect potable reuse needs to be a local decision based on community¹ values, complete and accurate information, and an assessment of the water supply options. While these factors are desirable for all projects, they are critical for indirect potable reuse. At this point there is not sufficient public consensus that any State mandate for indirect potable reuse would be appropriate.

The Task Force analyzed project experiences, listened to experts in public involvement, and reviewed some key literature. Some general public participation principles emerged:

1. The public needs to be involved in all phases of project planning with opportunities for involvement in developing and selecting alternatives, not just to be informed of final decisions.
2. Members of the public need to be listened to and responded to with respect. Their values and needs should be incorporated into the decision criteria. Their fears and concerns should be considered real and valid and mitigated with accurate information and, if necessary, changes in project design. Interaction should follow common courtesies of appropriate language, body gestures, and cordiality to keep focus on project issues.
3. Adequate and understandable information needs to be disseminated in many forums on proposed projects and water supply issues in general.
4. Recycled water projects need to be justified on fundamental needs or community desires, such as an adequate and safe water supply or prevention of water pollution.
5. Principles of environmental justice need to be incorporated. The public expects that costs and benefits of projects should be equitably shared.
6. The public needs a broad understanding of water supply issues to have a context in which to evaluate recycled water.

The Task Force has developed recommendations for a value-based decision-making model to improve public participation at the local level, especially during project development. It has identified areas where State and local leadership can be improved to increase general public support for water recycling and better policy decisions. It also recommends changes in the State's educational curricula and a State-sponsored media campaign to engender an underlying public understanding of water issues and water recycling and a climate of public support for water recycling.

2.1. Community Value-based Decision-making Model for Project Planning

Issue

Public participation and representation is founded on the idea that those who are affected by decisions or policies should participate or be represented in the policy making processes, because the public is capable of making wise

¹ Community — Public at large including, but not limited to, local ethnic groups, political/social/economic groups, environmental justice advocates and environmentalists.

and prudent decisions. The public should be involved throughout all project phases--the planning, deliberation, decision, design, and implementation. Such public involvement is not currently required by State law. Public access to information on proposed projects is commonly through the environmental review processes required by the California Environmental Quality Act (CEQA) and the federal National Environmental Policy Act (NEPA). Under these acts, the minimum public notification requirements are inadequate to engage the public. Furthermore, agencies typically attempt to involve the public when deciding on implementing a project. The public is often forced to decide on support or opposition to a project without background knowledge of local water issues and alternative water resources options.

Early public involvement can assist the project proponent in identifying and responding to the concerns of the public. Public participation creates empowerment and empowerment yields a sense of collaboration. With the need to supply additional water in the State and the potential use of recycled water projects to meet that need, water utilities and the decision-makers should make an investment in the public arena, so that their decisions will pay off in the long run for their customers and their communities.

Determining what a community values, then making decisions based on that information is the foundation of a community value-based decision-making model. This model encourages participants to recognize that most people believe in a unified set of fundamental values, then takes them further, into the realization that these values can be the basis for consistent and improved decision making. A values-based decision-making model should embody the general public participation principles listed in the introduction to this section. Recommendations 2.1.1 through 2.1.6 are components of an effective community value-based decision-making model.

Recommendation 2.1.1. Increase public participation through vigorous outreach, augmenting the notification requirements stipulated by CEQA and NEPA.

Approach and Implementation: NEPA and CEQA both establish requirements for public notification and opportunity to comment on environmental impact documents. However, these procedures are not adequate to fully engage the public. Neither law requires public participation in project formulation and alternatives development. There is no requirement for a public hearing under CEQA and a requirement for only one hearing under NEPA. While the perception is that these environmental laws are vehicles for public participation, they are mainly oriented toward full analysis and public disclosure of environmental impacts. These laws have become wedges to force project proponents to hear public concerns, but they were not designed as effective public participation tools. Considering the time and cost of developing recycled water projects, from project formulation through construction and implementation, there should be more opportunities for the public to participate. Early public involvement develops community support, while providing an opportunity to identify and address public concerns. This in turn assists the agency to design a project that meets the needs of the community. Therefore a more concerted public outreach process is considered necessary. Effective public participation can be encouraged and implemented at the State and local levels.

- i. State Level
 - a) To the extent that State funding agencies have existing statutory authority, they should require public information and outreach during project planning for recycled water projects in order to receive State loans and grants. In order to determine the existing statutory authority with respect to State loans and grants for water projects, the funding agencies, DWR and SWRCB, should conduct a legal review. This review should commence on 1 July 2003 with results obtained no later than 1 November 2003.
 - b) If additional statutory authority is needed, then in future bond laws the Legislature should specify a funding criterion that project planning include a public participation program. However, if the legal review reveals that no additional statutory authority is needed, the funding agencies should include public information and outreach requirements during project planning for recycled water projects to receive State loans and grants. Where statutory authority is adequate, the agencies should proceed with the recommendation at the conclusion of the legal review, or no later than 1 July 2004 and ongoing thereafter.
 - c) State guidelines should be developed for effective public participation actions that project proponents can take. An appropriate State entity to develop these guidelines would be the California Bay-Delta Public Advisory Committee (BDPAC) or its successor, which is

administered by the California Bay-Delta Authority. The BDPAC should utilize its subcommittees, such as the Environmental Justice Subcommittee. The BDPAC should provide advice and guidance to assess current requirements and determine procedures to incorporate community value-based decision-making into State funded loans and grants. The improvements should incorporate the general public participation principles listed in the introduction to this section and the components of the other parts of this recommendation and Recommendations 2.1.2 through 2.1.6. Time frame: January 2004 to January 2005.

ii. Local Level

In addition to regulatory changes, project sponsors should act on their own in good faith with the community, and implement an effective value-based decision-making model incorporating the general public participation principles listed above and the components described in Recommendations 2.1.2 through 2.1.6. Local agencies should carry out this recommendation beginning July 2003 and ongoing thereafter.

Recommendation 2.1.2. Project planners should hold more public meetings to gather and supply information at appropriate venues.

Approach and Implementation: A key element of value-based decision-making is identification of common values and interests of a group, a community, or communities within a community (such as neighborhoods, ethnic groups, political groups). Public meetings can be effective and efficient tools in reaching all interested and affected parties, to have meaningful dialogue with community members and to determine community interests and concerns. To make contact with the community members, public notices and other outreach materials should be available in the languages spoken locally; these should be placed in familiar community venues (e.g. civic organizations, libraries) and distributed at local stores in the project area. Community leaders should identify appropriate venues, and meetings should be held at times and locations that are convenient for the communities affected by the project. These meetings should provide information and resources (scientists, technical assistance) to the public so they understand the issues involved with a project. This recommendation should be carried out by local agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.1.3. Project developers should make project decisions that respect and incorporate the community's values and concerns (considering public health, growth, coordination with local planning, environmental justice issues, et cetera):

- i. Develop the project considering the values and ameliorating the concerns gathered at public forums.
- ii. Recruit potential recycled water users and community representatives for a stakeholder¹ group to assist in the review of the project, alternatives considered, and selection.
- iii. Meet with policy makers in the early stages and on a regular basis to obtain support to ameliorate challenges that could affect the project.

Approach and Implementation: After gathering the issues and concerns of a community through public meetings and other feedback systems like questionnaires, project planners should develop project alternatives that address the needs of the community. Specifically, project objectives should include those issues and concerns of the public. The project alternatives, which may include a water recycling option, are to be determined which might address those concerns. By developing and presenting a range of options designed to meet those interests, the public can select a project alternative or suggest changes that address those values.

The development of a stakeholder process that includes representation from as many groups and interests as possible is highly advisable. A stakeholder process should allow individuals, groups, and organizations whose interests are affected by the proposed project to effectively present their views within the process and to work with other community interests to develop a consensus on the direction an agency should take. Stakeholders should be provided access to technical analysis (science, economics, and environmental and social impacts) that enables informed participation. Although an alternative recommended through a stakeholder process may not be the most

¹ Stakeholders — Individuals and organizations who are involved in or may be affected by water recycling activities.

economical or desirable from an engineering standpoint, it may be the alternative most likely to achieve public support and successful implementation. Most importantly, a stakeholder process will help build trust between local agencies and the communities that they serve, which is essential to the success of potentially controversial projects.

The political scene is dynamic and changeable. Vocal opposition groups can inhibit political support for recycled water projects. In order for politicians to support a project they need to know the facts about a project, as well as be assured that the project has voter approval. Meeting with policy makers on a regular basis can help to inform politicians of the status of the project. Including representatives of communities and stakeholders who are not agency officials and support a project in meetings with politicians helps political leaders to understand the breadth of public support and to place any opposition in perspective. To be effective, the group should have sufficiently broad and diverse memberships who understand and support the project selected. This recommendation should be carried out by local agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.1.4. Project planners should convene an independent advisory committee composed of experts in the field and consumers from a variety of viewpoints, who have no vested interest, to review the proposed project alternatives, including implementation and operation issues, where needed.

Approach and Implementation: For those projects likely to cause controversy, an independent advisory committee, selected in consultation with the public, should be convened to review a proposed project and its alternatives in the context of other water resource planning decisions. To engender credibility, the advisory committee should be composed of experts in the field from a variety of viewpoints who are “above the fray” without a vested interest. Even with public meetings and stakeholder groups, there may still be individuals who did not have the ability to participate in the process. For those individuals, an independent advisory committee can provide quality assurance. This recommendation would be carried out by local agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.1.5. Water recycling should be presented to the public with other alternatives for locally achieving water supply goals.

- i. Evaluate all water resource alternatives using consistent criteria before proceeding with a water recycling project as part of an integrated water resources approach.
- ii. Evaluate water resource project alternatives based on assessment of all health, costs, environmental, social and relative risk factors, and degree of multiple benefits.
- iii. Provide on-going updates with all the current information, work progress, and decisions to the community to facilitate an educated choice.

Approach and Implementation: In order for a community to participate fully, the public needs to know the alternatives available to meet their objectives. After consensus is reached on the issues and objectives for a project, local agencies can provide the public with information on technologies (such as water treatment options) and practices (such as conservation). This information can be used for development of a complete palette of possible alternatives for achieving water quality and supply objectives. This procedure is part of integrated water resources planning — a comprehensive, interdisciplinary approach to water resource planning that encompasses water resource assessment, demand considerations, analysis of alternatives, risk management, resource diversity, environmental considerations, least-cost analysis, multidimensional modeling, and participatory decision-making and public input, among other factors.

Water conservation, water transfers, seawater desalination, and local storage may be other options to be evaluated. Water recycling itself may present several options in terms of geographic area to be served, certain types of uses and associated levels of recycled water treatment. Construction of dual distribution systems for delivery of recycled water for nonpotable uses may be an option when indirect potable reuse is being considered. Local agencies should supply sufficient information on all alternatives to the public, including the extent of infrastructure, relative risks, costs, energy needs, and potential environmental impacts so that meaningful fact-based dialogue can occur. Local agencies should study alternatives in sufficient detail to determine positive and negative aspects of each. During discussions of potential health concerns or unknowns associated with indirect potable reuse, health concerns and unknowns associated with other sources of supply must be included with the reminder that most natural sources of water are not necessarily free of contaminants. Specific examples of where various potential technologies have been implemented elsewhere should be provided including data on how well they perform. Providing tours of water

supply and treatment facilities can be very effective at this point, and will provide participants with a first hand view of these processes in action.

Local agencies should update the community with the current status of the project to facilitate an educated choice. Fact-based dialogue with the public may generate agreement as to the best alternative for the community. However, this choice may not match the agency's preferred alternative, which is often based on engineering and economic considerations alone. For example, in the case of newer communities, a dual piping option — where recycled water distribution pipelines can be installed during development — may prove to be the best option for utilizing recycled water. On the other hand, older and established cities with streets already jammed with other substructures would have a much more difficult task in implementing a dual piping option. By providing the public with accurate information on all possible alternatives, informed decision-making can take place to select solutions that will be supported by the public. This recommendation should be carried out by local agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.1.6. Local agencies should cultivate and utilize media opportunities for their projects:

- i. Inform media personnel (editors, reporters, anchors, etc) about recycled water and the project through media kits, fact sheets, websites, etc,
- ii. Prepare question and answer/fact sheets and press releases to address every issue raised,
- iii. Submit articles and opinion pieces to local media for publication,
- iv. Provide timely responses and corrections to any misinformation,
- v. Continually disseminate accurate and complete information on water issues to the public utilizing:
 - a) utility bill inserts,
 - b) regular public workshops,
 - c) community meetings,
 - d) Internet.

Approach and Implementation: The media plays an important role in the broadcasting of information to the public. The media can help inform the public about potential projects and opportunities for public input and participation. In order for the media to accurately and fully inform the public, project planners need to provide the media with accurate information.

Information regarding recycled water should provide the necessary background for understanding all water projects, not sell or persuade the media and thus the public to use recycled water. The information provided should include appropriate questions to ask of all water projects to level the playing field for evaluation of all water sources: groundwater, surface water, desalination, and reclamation, et cetera. This information should describe the advantages and disadvantages of each source in terms of planning, reliability, environmental impacts, and safety. Risk exists in every single source of water, even mountain spring water composed of glacial melt, and thus should be recognized and described. The benefits of recycled water should be communicated in terms of broader community desires, such as less environmental impacts than alternatives or improved supply reliability during droughts.

There is a need for on-going education to build a long-term public understanding of water issues and water recycling in particular. This can be done through direct agency communication to consumers, such as through bill inserts or Web sites, or through the media by channeling information and articles to newspapers, television stations, and other media.

2.2. Leadership support for water recycling.

Issue

State support for water recycling is not well known, even though the Legislature has been clear in its support for water recycling. The State Legislature enacted the Water Reuse Law of 1974 (Water Code sections 460-465) with the stated mission that “the primary interest of the people of the State in the conservation of all available water resources requires the maximum reuse of reclaimed water in the satisfaction of requirements for beneficial uses of

water.” Furthermore, State law declares that use of recycled water by communities will contribute to the peace, health, safety, and welfare of the people of the State (Water Code section 13511). Despite this legislation, some health and regulatory agencies at the local level lack a common mission when it comes to recycled water. Some local health offices are not familiar with recycled water applications, guidelines, rules and regulations. Variations in procedures and requirements cause confusion, uncertainty, and unnecessarily raise the unit cost of production and distribution of recycled water. Additionally, innovative uses for recycled water such as toilet flushing in office buildings or landscape irrigation for private homes may be dealt with differently by local health departments. The approval process necessary for such programs can be complex and can differ from county to county.

State leadership is needed to communicate its mission of encouraging recycled water use as stated in the Water Code throughout all government levels, to facilitate projects, and to communicate the rules clearly to local health offices and regional quality control boards. Additionally, mandated State agencies should take the lead in ensuring that local offices are consistent in their application of State policy.

Recycled water lacks unified definitions for discussing the various treatment levels available. Additionally, signs announcing the presence of recycled water have sent the public mixed messages about the water quality. Therefore, a statewide system of codification that refers to the various treatment levels and uses for recycled water would help to develop a common language that is more easily understood during public discussions of proposed projects. This new language can be appropriately applied to the signs to avoid mixed messages.

In addition to State responsibilities, local governments should be providing guidance on recycled water by adopting strong local ordinances that are adequately implemented and enforced. Many local jurisdictions have approved ordinances that require dual plumbing where recycled water is available. However, local regulatory agencies (building inspectors, code enforcement officers) are not requiring dual plumbing in many new developments. Many planning and/or public works departments do not have the staff or resources available to audit effective implementation of these ordinances.

Finally, public agencies should take a leadership role to encourage recycled water use by using, where feasible, recycled water in public agency buildings to flush toilets, and/or to irrigate landscapes and city parks.

State Support

Recommendation 2.2.1. Take a leadership role on water recycling:

- i. Develop an easily understood common language for describing various recycled water treatment levels and uses to improve public discussions of proposed projects.
- ii. Set a standard signage for regulatory use that increases the public’s understanding of recycled water.
- iii. Develop a consistent position on water recycling.
- iv. Convey the State's mission to increase recycled water use throughout all government levels via interagency collaboration.
- v. Facilitate recycled water projects and communicate the rules clearly to local health offices and regional water quality control boards.
- vi. Encourage recycled water use by setting an example and using recycled water in public agency buildings wherever practical.

Approach and Implementation: Recommendations 2.2.1 i and ii are intended to clear up apparent confusion and misunderstanding about recycled water. For meaningful dialogue to take place, recycled water discussion needs unified definitions for the various treatment levels available. For instance, most nonpotable recycled water use discussions speak of tertiary-treated (Title 22) water. However, when the discussion switches to indirect potable reuse projects, it is still referred to as “recycled water” even though such projects may have treatment far beyond filtration, including microfiltration, reverse osmosis, ultraviolet disinfection, or ozonation. Hence, the term “recycled water” should be supplemented with additional terminology that connotes the level of treatment and the allowable human exposure.

Prevalent signage also sends mixed messages about recycled water quality. For years the public has read signs that have given the message that recycled water is dangerous (skull and cross bones). Now, the public is told it is safe for certain uses. More appropriate signage is proposed in Recommendation 3.3.1.

To implement recommendations 2.2.1 i and ii the DHS should convene a six-month panel including members from industry and the public to create a set of short-hand terms for different types of recycled water. The goal is to develop a common language that is easily understood by both industry and the public. The panel should also address a standard signage for regulatory use that aids the public's understanding of recycled water. DHS should commence this panel by January 2004 with a completion date of June 2004.

As presented in recommendations 2.2.1 iii-vi, government, water industry officials as well as other stakeholders and interested groups need to have a shared understanding of recycled water so that they can take a leadership role and provide guidance. In 1994 a similar coalition of local, State and federal agencies and the WaterReuse Association of California adopted the "Statement of Support for Water Reclamation." A coalition, including DWR, SWRCB, DHS, water agencies and organizations, such as the Water Education Foundation, American Water Works Association, California Urban Water Agencies, California Urban Water Conservation Council, WaterReuse Association, and the Association of California Water Agencies should be formed to review the previous Statement of Support and revise it as necessary. This coalition could also:

- explore methods of interagency collaboration throughout all government levels to communicate the issues, regulations, and procedures on recycled water and methods to appropriately maximize its use,
- author a guidebook to communicate the rules on recycled water clearly to local governmental agencies, health offices, regional water quality control boards, et cetera, thereby facilitating projects by removing unnecessary impediments, and
- publish a list on existing and new recycled water informational programs to be distributed throughout the industry and the community.

DWR should lead the implementation of this recommendation beginning September 2003 and the results should be presented to the agencies on or before January 2005.

In addition to the coalition, each State agency should convey its mission with regard to appropriately maximizing recycled water by providing informational materials and education to the local agencies on the legislated recycled water regulations. State agencies should also take the lead in ensuring that local offices are consistent in their application of State policy. This recommendation should be carried out by State agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.2.1 vi displays how governmental agencies can lead by example. To encourage recycled water use, public agencies should take a leadership role by using recycled water in public agency buildings to flush toilets, to irrigate landscapes, and/or to irrigate city parks. This recommendation is to place the appropriate infrastructure into new buildings to utilize recycled water where feasible. Governmental facilities that can be served by recycled water should be retrofitted to irrigate with recycled water and dual plumbed to use recycled water for toilet flushing and cooling towers. This recommendation should be carried out by State and local governmental agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.2.2. State funding should be provided for public education and outreach.

Approach and Implementation: Public informational programs and outreach are not free. Communities will need financial resources to inform their public on water issues in general, and recycled water in particular. Therefore, all new bonds for recycled water projects should include public information and outreach as eligible expenditures. This recommendation should be carried out by State and local governmental agencies beginning July 2003 and ongoing thereafter.

Recommendation 2.2.3. The State should work closely with local agencies on water recycling to:

- i. Provide technical assistance on current and cost effective technology, greater education and clarification on recycled water use policy through informational materials and education supplied to the local agencies on the legislated recycled water regulations; and

- ii. Coordinate and publicize existing and new recycled water informational programs developed by various agencies for use throughout the industry.

Approach and Implementation: State agencies, such as DWR, SWRCB, and DHS, should assist local agencies with information and education on current and cost effective technology for recycled water projects, as well as guidance on legislated recycled water regulations. The State should make informational materials available and provide educational presentations for recycled water. State agencies should compile a list for publication on existing and new recycled water informational programs to be distributed throughout the industry and the community. The agencies should make use of the material published by the government and water industry officials coalition proposed in recommendations 2.2.1 iii - vi.

DWR, SWRCB, and DHS should carry out this recommendation beginning July 2005 and ongoing thereafter.

Local Government Support

Recommendation 2.2.4. Appropriate local agencies should adopt well-defined local recycled water ordinances.

Approach and Implementation: Local recycled water ordinances can facilitate the use of recycled water by specifying the conditions under which it is available or its use may be mandatory, the procedures for obtaining it and the requirements for the proper use of it to protect public health and prevent nuisance. To accomplish this recommendation, local governments need to consider their communities' needs for water and how recycled water fits into their overall plan. Since regions are unique, local governments need to appraise their water assets and all existing and potential water supply options. This is generally accomplished through their Urban Water Management Plan, water facilities master plan, the general plan or other planning documents. Local governments should carry out this recommendation beginning July 2003 and ongoing thereafter. The appropriate agency to adopt a recycled water ordinance is usually the local water retailer, which has jurisdiction over water supply and can govern the sources of water available to customers.

Regulatory Agencies Support

Recommendation 2.2.5. Local planning, building code enforcement, health and public works departments should effectively enforce local recycled water ordinances, through adequate staff and resources. Building inspectors and code enforcement officers should effectively enforce the installation of types of plumbing that would allow the use of recycled water in accordance with local recycled water ordinances.

Approach and Implementation: While retail water suppliers can adopt ordinances requiring the use of recycled water under certain circumstances, they do not have jurisdiction over most plan reviews for subdivision or building construction. Local governments that have such jurisdiction need to enforce plumbing practices that will allow recycled water ordinances to be implemented. Local governments, in particular health departments, should obtain adequate educated staff to apprise local enforcement officers of the status and regulations regarding recycled water. Local governments should carry out this recommendation beginning July 2003 and ongoing thereafter.

Recommendation 2.2.6. Convene a statewide independent review panel on indirect potable reuse to summarize the existing and on-going scientific research and address public health and safety as well as other concerns, such as environmental justice, economic issues and increased public awareness.

Approach and Implementation: Recycled water projects in which the eventual end use will be a source of drinking water are termed indirect potable reuse projects. These projects utilize recycled water for groundwater recharge or for reservoir augmentation. The public has genuine and legitimate concerns regarding the safety of using recycled water for human consumption.

While many scientists studying recycled water believe the multiple safety factors used in its production are adequate to safeguard public health, they nevertheless recommend proceeding with indirect potable reuse with caution and carefully considering its need within the context of the local or regional water supply needs and options. The public

has not always been assured. Because of the source of recycled water and the potential for ingestion, indirect potable reuse projects need to proceed in an environment of a fully informed and consenting public. The public should be provided with information about any known risks associated with groundwater recharge or reservoir augmentation, and information on possible contaminants and their detection. The measures taken to avoid, lessen or eliminate the various risks should be provided to the interested public. The public also wants to know the monitoring procedures as well as what emergency action plans are in effect in the case of any detected contaminant. An understanding of the risks associated with other possible sources of supply, such as rivers that receive discharges from wastewater treatment plants or contamination from other influences, can provide a realistic picture of recycled water quality.

Over the past ten years, several agencies have been unsuccessful in attempting to implement recycled water projects that featured indirect potable reuse for groundwater recharge or for reservoir augmentation. Because these projects encountered public opposition, it is obvious that agencies also need guidance on how to approach the public on the issues surrounding recycled water.

Some factors associated with indirect potable reuse in California need further investigation and clarification. With respect to scientific factors, previous panels have advised the State on the areas of health risk and the needs for further research, which is on-going. However, there has been a problem with articulating the science and the previous expert findings and assuring the public that public health protection has been a paramount concern of State health officials in drafting regulations and approving projects. In order to provide better communication of this information to the public, a panel on indirect potable reuse should be convened to review the science, as well as other factors associated with indirect potable reuse, such as public perception, economics and environmental justice, and advise the State and local agencies on how to proceed with indirect potable reuse. One approach would be to use the California Bay-Delta Science Program, which is administered by the California Bay-Delta Authority (Authority). The Authority is responsible for CALFED Bay-Delta Program to develop and implement a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta System. As part of this function, the Authority evaluates water supply options that could relieve stress on the Bay-Delta System, including water recycling.

The California Bay-Delta Science Program (Program) is developing the best available scientific information, using world-class science and peer review, to guide decisions and evaluate actions that are critical to its success. This Program has three goals. The first goal is to establish a body of knowledge that is unbiased, relevant, authoritative and integrated, while communicating that knowledge to the scientific community, agency managers, stakeholders and the public. The second goal is to establish protocols and incorporate independent peer review into all Program activities. The third goal is to develop science-based performance measures for each CALFED program.

For more comprehensive guidelines on indirect potable reuse, the California Bay-Delta Science Program should appoint a panel to review existing scientific information and on-going research, assess the potential health risks of indirect potable reuse within the context of other health risks and summarize this information in language easily accessible to the public. The panel could make the public aware of potential unknown factors related to public health and articulate the on-going research to identify new potential risks and the regulatory controls in place to minimize the potential impacts should the presence of harmful chemicals be discovered in the future. The panel could review the experience of previous proposed and implemented projects and obtain a better understanding of public perception and concerns, such as social equity in the exposure of risks. The panel could advise the State and local agencies proposing indirect potable reuse on how to incorporate appropriate public information and participation in the planning process to ensure full awareness, equity, and consent. This recommendation should be carried out beginning January 2004 and its report completed and published by July 2005.

2.3. Educational Curricula

Issue

Some members of the public have a misperception that water they use is pure, and once it has been recycled, it has fallen from grace. School programs could teach how all water is recycled, and describe both natural and engineered approaches to assuring that water is safe for human consumption. Although water resource issues and very basic

water cycle information is presently being taught in public schools, there is considerable room for improvement. Having the importance of water recycling added to the State education standards would dramatically improve the inclusion of the concept of water recycling in classrooms.

While individual water agencies can make strides in introducing students to recycled water and other water resource issues through their existing classroom education programs, significant change cannot take place until recognition of these water issues is made at the level of the State Board of Education. The board issues “content standards” for each grade, K-12, in each subject area such as science, math, history-social science and English-language arts. Because schools are now graded on how their students perform on the standardized State tests, principals and teachers are reluctant to allow classroom time for programs such as water education unless a clear connection can be made to the content standards for their grade level.

Many local water agencies with education programs are aware of the increased emphasis being placed on testing and the curriculum content standards and have made efforts to align their programs to the standards. While concepts such as the water cycle are included in the science content standards, recycled water is not mentioned specifically in any of the science or history/social science standards. The State needs to encourage the school districts to implement programs, and to provide educators the necessary materials and support for successful programs about water.

Recommendation 2.3.1. A statewide panel should be convened to recommend changes to public schools and higher education curricula:

- i. Develop a comprehensive water education curriculum for each grade (K-12) that incorporates recycled water in the Content Standards for California Public Schools: science standards and/or the history-social science standards.
- ii. Incorporate recycled water education into the curricula of institutions of higher education.
- iii. Enhance existing educational materials or programs, for example those offered through the Water Education Foundation, or other organizations.

Approach and Implementation: To implement recommendation 2.3.1 i, the Department of Education should appoint a panel on developing comprehensive water education curricula that includes recycled water education. It is important that public education include a complete discussion of the water cycle, including elements such as wastewater treatment plant discharges and their influence on surface and groundwater supplies. The Department of Education should work with educators and the Department of Water Resources to develop comprehensive water education curricula. Department of Education should consider changes to carry out this recommendation beginning July 2003 and incorporate the changes into the applicable Content Standards at appropriate grade levels by January 2007.

The following concepts should be a part of this curriculum:

- Water is a finite resource. There is no such thing as “new” water.
- The population of California is growing, whereas developed water supplies are limited and in some cases diminishing.
- Conservation of water and other natural resources is critical.
- At the Grade 5 level and above, the water cycle should be discussed in each grade with greater detail and complexity in higher grade levels. A more sophisticated explanation of the cycle should include wastewater treatment discharges and their influence on surface and groundwater supplies.
- Water recycling is an important component in conservation efforts in California.
- Wastewater treatment plants mimic the way nature cleans water (sedimentation, aeration and filtration). However, treatment plants can clean larger quantities of water more quickly than nature.
- Recycled water is currently used for a variety of applications in California.
- Water quality is important to public health and must be considered in determining appropriate uses of recycled water.

Water education should also include field trips to water treatment and water recycling facilities, so students can learn about these processes first hand. Field and lab work should provide hands-on experience with many water cycle elements.

Recommendation 2.3.1 ii points out that in addition to the need for people to become familiar with recycled water, there exists a need for university-trained specialists. Therefore, it is recommended that DWR approach the California universities about the need for more recycled water experts and request the incorporation of recycled water into their curricula. State funds available for water recycling research could be used to increase faculty and student interest in water recycling in California universities, as recommended in Recommendation 6.2.1. DWR should carry out this recommendation beginning July 2003.

To implement recommendation 2.3.1 iii, DWR should help to enhance existing educational materials or programs on recycled water such as are currently offered through the Water Education Foundation, or through assistance on science fair projects. The enhancement should include such things as coloring books on recycled water, poster contests, et cetera. DWR should carry out this recommendation beginning July 2004.

2.4. State-sponsored media campaign:

Issue

The media plays an important role in broadcasting information to the public. The media can help inform the public about activities in their community by assisting utilities to spread the word about potential projects. The media informs the public of the opportunity, as well as responsibility, to speak up on important issues. In order for the media to inform the public, they need to be provided with accurate information. Regular briefings with the media ensure that the public, media, politicians, and project supporters are informed and that current questions are addressed. Informing the media is important because projects can take decades, and the people consulted in the beginning during project planning may no longer be around by the time a project is ready for implementation. Additionally, a well-informed public and a broad base of community supporters can reduce the effect of opposition caused by bad press and political misinformation.

Recommendation 2.4.1. The State should develop a water issues information program for radio, television, print, and other media.

Approach and Implementation: As with the anti-smoking campaign that includes radio and television advertisements reaching a large audience, a similar program should be developed to provide information on water issues on a large scale. These elements should be discussed in a water cycle context to increase public awareness of the “big” water picture. For example, a message to conserve water should also include a reminder that water is finite and therefore precious and must be preserved. By presenting water issues in the context of the water cycle, the public will become aware of the realities of water supply, including the fact that all water is recycled, and that there is considerable wastewater effluent in our present water supplies. In addition, water quality topics regarding newly discovered contaminants or concerns should be presented in a water cycle format to help describe relative risk in the context of all water supplies rather than concentrating on a specific supply such as recycled water. State agencies should develop a water issues information program and protocol for radio, television, and print media beginning July 2004 and ongoing thereafter.

Recommendation 2.4.2. The State should work with organizations that have produced videos on water issues, including recycled water, and fund updates and expanded programming and encourage cable television networks to broadcast these videos regularly throughout the State.

Approach and Implementation: The State should develop a program on water issues to inform the public on a large scale by utilizing the media. This program should be formulated utilizing other successful media informational campaigns. The campaign should utilize radio and television advertisements to reach large audiences. The State should also work with organizations such as the Water Education Foundation and other stakeholder groups, that have produced videos on water issues, including recycled water, and fund updates and expanded programming.

Cable television networks should then be encouraged to broadcast these videos regularly throughout the State. State agencies should carry out this recommendation beginning July 2005.

Recommendation 2.4.3. State agencies should prepare opinion editorial pieces for publication in newspapers throughout the State.

Approach and Implementation: State agencies should develop opinion editorial pieces on water issues, including recycled water, for publication in newspapers throughout the State beginning January 2004.

Recommendation 2.4.4. The State should retain an advertising agency/public relations firm to assist in the development of short messages with specific information on urgent topics such as drought, conservation, pollution prevention, water quality, stormwater, wastewater, or recycled water including indirect potable reuse.

Approach and Implementation: The State DWR should carry out this recommendation beginning July 2004.

3. Plumbing Code/Cross-Connection Control

Recycled water may be used in buildings (cooling, toilet and urinal flushing, trap priming, fire suppression systems, industrial purposes, etc), and for irrigation at residential, park, school, and other urban landscape areas.

Regulations and guidelines have been developed to address public health concerns with the possible misuse of recycled water or the connection of recycled water piping with the potable water piping (cross-connection). An example of misuse is when someone unknowingly drinks from a recycled water outlet. A cross-connection can occur during initial construction, when a potable water system is retrofitted to recycled water use and potable water connections are overlooked, or when modifications or repairs are made to expand the system or increase pressure.

Portions of three California Codes have been identified as including impediments to recycled water use. These are the California Plumbing Code (CPC) Sections 601.2.2 and 601.2.3 and Appendix J dealing with dual plumbed systems, Title 17 Section 7583 et seq. dealing with cross-connection control, and Title 22 Sections 60313-60616 dealing with recycled water dual plumbed systems. These codes pose problems because of their adoption status in some cases, inconsistencies between codes, and possibly unnecessarily restrictive requirements.

3.1. Uniform Plumbing Code Appendix J

Issue

A national plumbing standard that is used by many states and localities is the Uniform Plumbing Code (UPC) that is issued by the International Association of Plumbing and Mechanical Officials (IAPMO). Appendix J of the Uniform Plumbing Code provides design standards to safely plumb buildings with both potable and recycled water systems. While the California Building Standards Commission (CBSC) uses the UPC as the basis of the California Plumbing Code, neither the CBSC nor any other California State agency has adopted Appendix J for use in California. The fact that Appendix J does not have official status in California is not well known, so some local agencies have been under the impression that it is a mandatory standard. On the other hand, at least one agency, the City and County of San Francisco, will not use Appendix J unless it is adopted by a State agency. Lacking a State standard, San Francisco has been hesitant to encourage indoor uses of recycled water. The IAPMO version of Appendix J contains inconsistencies with California regulations governing recycled water. There is a need for a California standard for recycled water plumbing in buildings.

Recommendation 3.1.1. A California version of Appendix J of the Uniform Plumbing Code should be adopted in order to avoid the inconsistencies between the IAPMO version and other California regulations affecting indoor use of recycled water.

Approach and Implementation: The Department of Water Resources in collaboration with other stakeholders should initiate the process to adopt a California version of Appendix J, considering the recommended draft of Appendix J included in Appendix D of this report. Time frame: July 2003-September 2005.

3.2. DHS Guidance on Cross-connection Control

Issue

Water Recycling Criteria are contained in Title 22 of the California Code of Regulations and provide requirements that protect public health. Article 5 of the criteria (Sections 60313-60316) include dual plumbed requirements are intended to prevent the unintentional misuse of recycled water and the cross-connection of the recycled water distribution system with the potable water system within buildings and for residential landscaping. These recycled water use sites are called out for special controls because they are believed to be at the greatest risk for unplanned public exposure. The proximity and complexity of recycled and potable plumbing systems within buildings and the potential for homeowner modifications in residential situations create a risk. The dual plumbed section uses a combination of posting, plumbing access restrictions, plumbing labeling, supervision, periodic inspection, and testing to minimize the chance of misuse or cross-connection.

There are two concerns with the dual plumbed requirements.

- i. In some counties the requirements are being applied to irrigation use areas not specified in the regulation. The sites that the dual plumbed requirements in Title 22 apply to are identified through a series of definitions in the regulation.

Section 60301.310 defines “facility” as “any type of building or structure, or a defined area of specific use that receives water for domestic use from a public water system as defined in section 116275 of the Health and Safety Code.”

Section 60301.250 defines “dual plumbed system” and “dual plumbed” as “a system that utilizes separate piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following purposes:

- (a) to serve plumbing outlets (excluding fire suppression systems) within a building or
- (b) outdoor landscape irrigation at individual residences.”

Most of the requirements in Title 22, Article 5 (see Appendix E) apply only to dual-plumbed systems – plumbing outlets within buildings and landscape irrigation at individual residences. Due to a misunderstanding of the regulations, especially the definitions cited above, some county health departments have applied the dual plumbed requirements to all sites with both potable and recycled water service. Because the provisions for dual plumbed facilities are more stringent than for other types of sites where recycled water is used, these other sites have experienced inconvenience and expense that is not mandated by regulation.

- ii. Title 22, Section 60316(a) requires that “The recycled water system shall also be tested for possible cross-connections at least once every four years.” The regulation Section 60314(a)(3) allows the use of a pressure (shut down), dye, or other test method. The shut down test is commonly used because it is considered conclusive, but this procedure disrupts water service, which may not be acceptable for certain users, such as penal institutions, or may be costly for some users, such as continuously operated industrial facilities. In addition to dye testing, at least one other method of assuring the absence of a cross-connection in buildings has been proposed, using numbered breakable seals on valves to detect when plumbing work has been done and log books to record what type of plumbing work was done. This latter procedure is described in the proposed draft California Appendix J included in Appendix D of this paper.

Recommendation 3.2.1. DHS guidance should be prepared that would clarify the intent and applicability of Title 22, Article 5. If guidance cannot be written to accomplish this, the regulation should be rewritten.

Recommendation 3.2.2. DHS guidance should be prepared that would clarify the requirement for testing in Title 22, Section 60316(a) and stress that alternatives to a pressure test are sufficient in many cases.

Recommendation 3.2.3. DHS should amend Title 22, Article 5 to incorporate inspection and testing requirements consistent with whatever requirements are adopted as part of a California version of Appendix J of the California Plumbing Code, as recommended in Recommendation 3.1.1.

Approach and Implementation: DHS should carry out recommendations 3.2.1 through 3.2.3. Time frame: July 2004-September 2005.

4. Regulations and Permitting

The most important State standards and regulatory programs that affect water recycling fall into two categories: public health and water quality. The DHS is responsible for adopting uniform statewide recycled water criteria related to public health and for advising the RWQCBs in their drafting of permits for each recycled water system. DHS has 21 districts in the State, which do not always uniformly interpret the State standards. County health departments also have jurisdiction over some aspects of recycled water use. In some areas, local health departments have elected to operate programs to control cross-connections. There are instances where local requirements have exceeded the requirements in State regulations, imposing an additional burden on water recycling systems and, perhaps, exceeding local authority.

Water quality regulations and the issuance and enforcement of permits for the use of recycled water are administered by nine RWQCBs under the overall jurisdiction of the SWRCB. Each RWQCB is controlled by independently appointed boards. Due to different hydrologic conditions, water quality issues and regional perspectives, the interpretation of laws and regulations governing recycled water has not always been uniform throughout the State.

Issues that have been identified are regulation of health and safety, regulation of incidental runoff, uniform interpretation of State standards, water softeners, permitting procedures, and source control.

4.1. Health and Safety Regulation

Issue:

Recycled water must be fully protective of public health and safety. The existing public health standards and regulatory structure for the use of recycled water are found in Titles 17 and 22, which were last updated in the year 2000. Because of the growing use of recycled water and the continued need to protect public health and safety, it is appropriate to regularly review those standards and the regulatory structure. At the same time it is critical that there is on-going research into the emerging public health issues associated with recycled water to determine if there are any gaps in the current regulations of recycled water. Additionally, there is a need for a strong regulatory structure that promotes consistency and uniformity of regulatory oversight in California.

Recommendation 4.1.1. The Department of Health Services should involve all stakeholders in the review of the following:

- i. potential new factors that could affect the health and safety associated with the use of recycled water,
- iii. need for regular periodic updating of the regulations and statutes to continue providing for public health and safety in the use of recycled water,
- iv. effectiveness of existing regulatory structure including roles of State and local regulators,
- v. whether there is a need for local enforcement agencies to have the authority to apply more protective requirements than what is included in Titles 17 and 22, and, if so, what should be the extent of that authority, and
- vi. additional research (see Recommendation 6.1.1. Research Funding).

Approach and Implementation: DHS should involve all stakeholders including, but not limited to, researchers, environmental health directors and officers, epidemiologists and toxicologists, users of recycled water, recycled water producers and purveyors and others. Time frame: July 2003 to June 2004.

4.2. Incidental Runoff

Issue

Recycled water applied for irrigation is intended to remain on the irrigated areas to avoid public health and nuisance problems from runoff. Permits, issued by the RWQCBs, authorizing the use of recycled water for irrigation typically include provisions prohibiting runoff. Incidental runoff or overspray of minor amounts of irrigated water at the edges of irrigated areas is difficult to prevent. It is also difficult to prevent runoff of rainwater from areas irrigated with recycled water or from aesthetic ponds on golf courses filled with or previously filled with recycled water, especially during major storm events. Some RWQCBs strictly enforce the runoff prohibitions, resulting in the need for expensive design provisions or preventing the feasibility of using recycled water. The runoff prohibitions have been dubbed the “one molecule rule,” implying that the existence of one molecule of wastewater origin in runoff constitutes a discharge of wastewater.

Recommendation 4.2.1. The SWRCB should convene a committee to review the legal requirements of federal and State statutes and regulations that relate to the regulation of incidental runoff and to determine the regulatory and enforcement options that are available to Regional Water Quality Control Boards. This review should include the following:

- (a) An evaluation of best available scientific data that demonstrate the effects of discharges of incidental runoff. Many recycled water producers and/or distributors have performed varied testing and monitoring of incidental runoff that could be available to the committee. This scientific evidence may be in the form of reporting requirements to regional boards, testing requirements for spills, State Implementation Plan (13267 letter), or other reports prepared for various reasons. The committee should recommend best management practices that under normal environmental conditions would allow discharge of incidental runoff without harm to the environment.
- (b) How other states address comparable situations in regulation and enforcement.
- (c) Within current legal constraints, with respect to discharges from storage or decorative ponds at use sites, options to be evaluated should include, but not be limited to:
 - (i) Development of statewide general permit requirements for ponds filled with recycled water. Within the general permit, unintentional discharges of commingled recycled and stormwater would not be treated as violations, but rather water that is a mixture of rainwater and recycled water that runs off a site as a direct result of rainfall. Specific requirements of the permit would include best management practices and a method of uniform enforcement across the State.
 - (ii) Regional Water Quality Control Board adoption of a specific waiver of waste discharge requirements for unintentional recycled water overflows pursuant to Water Code section 13269.
 - (iii) Allowance of discharges under an NPDES permit with the following conditions:
 - a. compliance point to be at the point of leaving the wastewater treatment plant (WWTP) rather than exit of the pond,
 - b. WWTP NPDES permit may incorporate any requirements applicable to use site ponds rather than a separate permit being required for each use site where a pond exists,
 - c. monitoring and testing shall be established relative to the pond/site, and
 - d. California Toxics Rule would apply to WWTP discharge only.
- (d) With respect to other forms of incidental runoff, options similar to those above should be evaluated.

Approach and Implementation: It is uncertain how much flexibility exists within the current framework of State and federal statutes and regulations in regulating incidental runoff of recycled water. It has been suggested that other states interpret federal requirements differently than the SWRCB and RWQCBs in California. It also appears that within California RWQCBs are not consistent in their regulation of incidental runoff. The Task Force participants discussed a recommendation to amend either State or federal statutes. However, it would not be

appropriate to recommend statutory changes without understanding what options exist under current statutes and, if these options are inappropriate, which State or federal law should be amended. The SWRCB should create a committee to conduct a legal analysis of the problem and the permissible options within the current legal framework. There is the possibility that a legislative remedy may be necessary, but this cannot be recommended without the legal analysis first. It would be helpful to decision-makers if there were more documentation regarding the water quality impacts of incidental runoff. If there are situations where a minor escape of recycled water from a use site would not have a negative impact, then there would be a basis for seeking more regulatory flexibility. Time frame: July 2003-January 2004.

4.3. Uniform Interpretation of State Standards

Issue

Inconsistent regulation of water recycling by State and local officials leads to confusion and uncertainty in how to design and manage water reuse systems and appears to have led to overly restrictive regulation and added costs, creating an obstacle to achieving the full potential for water reuse.

Recommendation 4.3.1. The SWRCB should appoint and empower a key person to provide oversight of the water recycling permits issued by the various RWQCBs. This person would act as an ombudsman to facilitate recycling and arbitrate conflicts.

Approach and Implementation: While the SWRCB attempts to achieve uniform interpretation and application of laws and regulations through issuance of guidance documents, it has not focused on water recycling in recent years. The SWRCB serves as an appeal board for reviewing disputes over RWQCB rulings, and SWRCB decisions in these disputes often create precedents that are applied statewide. However, there is no current on-going effort to oversee the regulation of water recycling. As water recycling increases in the State and the complexity of situations increases, there is a need for a water recycling specialist within the SWRCB oversight functions who is familiar with all applicable statutes and regulations, the variety of local conditions occurring with water reuse, and the potential administrative approaches to respond to those conditions. Time frame: August 2003-ongoing.

Recommendation 4.3.2. The DHS needs to take steps to ensure the uniform interpretation and application of water recycling criteria in Title 22 and cross-connection control provisions in Title 17 of the California Code of Regulations.

Approach and Implementation: The DHS has a Recycled Water Unit that has the function of developing guidance for all of the DHS district staff on various issues, of assembling guidance to be readily accessible, and coordinating meetings to discuss issues as they arise and to provide a forum for staff from various districts to collectively agree on approaches. Nevertheless, there appears to be inconsistent interpretation of statewide standards and a lack of public knowledge that the Recycled Water Unit exists to help resolve these inconsistencies. There appears to be a need for improved training of district staff on recycled water standards and communication with district staff to achieve more uniformity. DHS should develop and implement a plan to increase the public awareness of the Recycled Water Unit, increase its role in coordinating the interpretation and application of State laws and regulations, and improve centralized training of district staff in the regulation of water recycling projects. Time frame: Plan development: July-October 2003; Implementation: November 2003-ongoing.

Recommendation 4.3.3. A legal opinion needs to be rendered whether authority exists for local health agencies to adopt water recycling requirements that are more restrictive than those included in Titles 17 and Title 22.

Approach and Implementation: Statewide rules for cross-connection control and recycled water quality are specified in Titles 17 and 22 of the California Code of Regulations. Some DHS district offices, county health departments, or RWQCBs have imposed requirements that may be more restrictive than the requirements in Titles 17 or 22 or imposed on recycled water use sites requirements not specifically addressed in statutes. Health officials cite their authority to do this as Section 116800 of the Health and Safety Code. This authority has been disputed but the issue remains unresolved. The Opinion Unit of the California Department of Justice (Attorney General's Office) should be requested to conduct a legal analysis to determine the latitude that is permitted to impose more restrictive requirements. Time frame: July-October 2003.

Recommendation 4.3.4. Water recycling programs in Florida should be investigated to determine whether there are concepts that should be adopted in California.

Approach and Implementation: The State of Florida has been cited as a model of a state that has a regulatory structure that safeguards the public while allowing extensive water recycling to take place without unreasonable impediments. One or more Florida officials should be invited to a workshop to exchange information on regulatory approaches in Florida in contrast to California to identify any useful ideas for changes in California. This workshop should be hosted by SWRCB, DHS, and other knowledgeable parties. Time frame: January-February 2004.

Recommendation 4.3.5. The RWQCBs should be more proactive during the planning of recycled water projects so issues can be addressed before design commences.

Approach and Implementation: In order to ensure that the design of wastewater treatment and water recycling facilities will meet regulatory requirements, it is necessary that the requirements be known before the beginning of design. The RWQCBs should be involved during the planning process of projects so that issues can be resolved and projects can proceed without regulatory delays during design and construction. Time frame: July 2003-on-going.

Recommendation 4.3.6. Each RWQCB should have a resident expert or ombudsman on water recycling to provide consistency in permitting, coordinate with the SWRCB and other RWQCBs in maintaining consistency, and to assist agencies in facilitating permitting and conflict resolution.

Approach and Implementation: Because of a lack of familiarity with issues and regulations peculiar with water recycling, some RWQCB staff may provide guidance to agencies that is inconsistent with other staff or with appropriate interpretation of regulations. Assigning a person at each RWQCB office as a specialist or ombudsman in water recycling would provide a resource for the office as well as a liaison with the SWRCB, DHS, and other RWQCBs to improve understanding of regulations and consistency in their application. An ombudsman would also serve as a contact person for the public and agencies to help them understand the regulations and the procedures needed to receive permits to proceed with projects. This person could also act as a mediator between the public and RWQCB staff when conflict arises to help clarify issues and determine the most efficient way to resolve the conflict. Time frame: July 2003-on-going.

4.4. Water Softeners

Issue

Over the last few decades, increasing numbers of residents in California have installed water softeners in their homes to reduce problems caused by hard water. Unfortunately, the use of softeners, particularly onsite, self-regenerative water softeners, has led to increased salt in the water that is recycled from municipal wastewater. Any salt added to recycled water can push recycled water agencies into non-compliance with their water quality permits and make the recycled water unmarketable for irrigation use, currently the primary use throughout the State, and for some industrial uses. Restrictions on the use of water softeners by local agencies have been overturned in court suits. Legislative attempts have been made to strengthen local control over household water softeners to allow more restrictions, but little headway has been made against the resistance of water softener manufacturers. Three recommendations have been developed to address this issue.

Recommendation 4.4.1. Local agencies should be empowered to regulate the discharge of residential water softeners in the same manner as other sources of discharge into sewers. Legislation should be proposed to amend the Health and Safety Code Sections 116775 through 116795 to reduce the restrictions on the local ability to impose bans on or more stringent standards for residential water softeners.

Approach and Implementation: Existing law establishes efficiency standards for self-regenerative water softeners in terms of the amount of water hardness reduction per pound of salt addition. Local agencies are allowed to regulate water softeners but only under conditions wherein the local agency is out of compliance with its discharge permits. The most significant contributions of other pollutants to sewer systems are more easily regulated. It is

recommended that the Legislature should pass more flexible regulatory provisions for water softeners. Time frame: July-December 2003.

Recommendation 4.4.2. On-going or proposed studies on water softeners should continue to be pursued to develop alternatives for salt reduction in recycled water. Funding should be sought for such studies.

Approach and Implementation: A committee should be established to review the literature and on-going and proposed studies on water softeners and their contribution to salinity problems with the purpose of identifying additional study needs. It is suggested that a research-related institution, such as the WaterReuse Foundation initiate this committee. Time frame: July-September 2003.

Recommendation 4.4.3. Within the current legal restrictions, local agencies should consider publicity campaigns to educate consumers regarding the impacts of self-regenerative water softeners and promote the use of off-site regeneration by service companies. They should also consider financial incentives to upgrade older inefficient appliances to the current standards.

Approach and Implementation: Local agencies can influence consumer use of self-regenerative water softeners through education and financial incentives to replace older water softeners with more efficient ones that would reduce the salinity problem. Time frame: July 2003-on-going.

5. Economics of Water Recycling

Economic analysis of water recycling projects takes into account the true benefits and costs incurred to society. This entails the examination of the benefits and costs one would expect to be associated with a recycled water project. Financial analyses, in contrast to economic analyses, are intended to determine cash flow for a project and the feasibility to secure sources of funds to pay for project capital and operating costs. Financial analyses are commonly performed by agencies, but economic analyses typically are not unless they are required by funding agencies as a funding criterion. Economic analyses, similar to environmental impact studies, allow a full and transparent accounting of costs and benefits to readily identify impacts not apparent in single viewpoint of most financial analyses. In addition, by analyzing all alternatives to water recycling to achieve project objectives, such as water supply, all alternatives can be compared on an equivalent basis to identify alternatives that have the least net cost to society.

Examples on the benefits side of a recycled water project are savings in the form of avoided costs of developing new fresh water sources and lower fertilizer costs because of nutrients present in recycled water; and on the costs side, capital costs and operations and maintenance (O&M). These are known as market benefits and costs since there is an observable market price to quantify the costs and savings. Though more difficult to quantify, one must also consider in an economic analysis the non-market benefits and costs, like environmental impacts. Non-market benefits and costs are named such because markets do not exist where one can buy and sell them for a price. However, these impacts often represent key local, regional, or societal benefits and costs that if ignored would omit a major portion of any systems-based economic feasibility analysis. To that end, analyzing non-market benefits and costs help cast a wider net in identifying stakeholders and developing collaborative partnerships early in the project planning process.

During the 1970s the concept of cost-effectiveness was introduced to incorporate a more rational basis of comparing alternatives based on true costs while still recognizing nonmonetary factors. Adapted to water recycling, the application of cost-effectiveness can be stated as:

A water recycling project is considered cost-effective when, compared with the development of other alternatives to achieve the project objective, the proposed project will result in the minimum total resources costs over time to meet project objectives. Resource costs to be evaluated include monetary costs as well as nonmonetary factors, including social and environmental effects. An economic analysis, which monetizes costs and benefits associated with each alternative, including costs or benefits that are not just direct project costs and benefits, is given primary consideration unless other factors are overriding. Other important factors include an assessment of the recycled water market, availability of recycled water, financial feasibility, energy consumption, engineering, and environmental impacts.

Federal and California State funding programs adopted cost-effectiveness as a funding criterion and used the economic analysis as the basis for measuring total resources costs.

Another application of economic analyses is the allocation of costs on an equitable basis. Identifying the true benefits and costs of projects to a practical level of detail can help identify the proportion of the total benefits a project beneficiary is expected to enjoy and is a starting point to identifying an equitable share of funding responsibility.

Funding agencies for recycled water projects in California such as the SWRCB, DWR and USBR, each has its own economic analysis process and criteria for project funding. While there might be overlap in the basic economic analysis, specific requirements may cause the analysis to be incompatible across agencies, so that “apples are being compared to oranges.” Similarly, many funding agencies require some economic analysis or data reporting in their applications, but these requirements are sometimes not consistent, causing the applicant to do additional work to tailor each application. A consistent economic feasibility framework across funding agencies would greatly decrease duplicative work, allow projects to be compared by the same criteria and increase the opportunity for communication and collaboration for planning and identifying equitable funding partnerships.

5.1. Uniform Analytical Method for Economic Analyses

Issue

Each funding agency has its own economic analysis procedure and criteria for project funding. This lack of consistency complicates the task of project proponents intending to apply for State or federal financial assistance. Conducting an economic feasibility analysis often requires a broader investigation so as to include cost or benefit factors beyond the local project area and the non-market benefits and costs. Most local agencies consider only the cash flow factors that the agencies will experience. They are not accustomed to the concept and procedures of economic analyses. In addition, they often do not have the resources to determine some of the factors that should be included in economic analyses, such as impacts beyond their boundaries. To assist local agencies, a methodology to carry out economic analysis is needed.

Defining all potential benefits of a project will also help in distributing the funding burden of projects between beneficiaries. Without an equitable distribution of the funding burden, opportunities may be lost to develop recycled water projects, which is a clear impediment to increasing the use of recycled water.

Recommendation 5.1.1. The State should lead in developing a uniform method for analyzing projects using economic analysis procedures and a consistent economic feasibility framework across funding agencies. This could be accomplished by an advisory team of economists, recycled water experts, and stakeholders.

- (a) Identify a set of desirable characteristics for an economic feasibility analysis framework based on true benefits and costs for recycled water projects in California.
- (b) Review existing frameworks to find the commonalities and gaps based on the characteristics from the above recommendation; add components to the framework that fill in the gaps.
- (c) Develop a practical and implementable process to identify and include non-market benefits and costs into the framework. Development of non-market benefits and costs that are associated with regions or types of recycled water use would provide results that could be applied to many projects. This is a large task and could be undertaken by both an advisory team and special studies.
- (d) Develop a mechanism to increase the opportunity for identifying equitable capital and operational funding schemes according to the beneficiaries based on allocation of the benefits and costs in the economic analysis. This could include beneficiaries on both the local, regional, and statewide level.
- (e) Develop guidance to conduct an economic feasibility analysis.
- (f) Develop a mechanism for information from the economic feasibility analysis to feed into the financial feasibility analysis and funding decision-making.
- (g) Develop appropriate benchmarks for comparing the incremental costs of developing recycled water with the cost of developing an equivalent amount through other measures such as additional water or demand reduction.

Approach and Implementation: An expert panel of economists and water recycling specialists should be formed by DWR/SWRCB/DHS to carry out this recommendation. The panel should be formed by September 2003 and submit its findings to DWR by August 2004.

6. Science and Health/Indirect Potable Reuse

Public acceptance of recycled water use is dependent on confidence that its use is safe. The public entrusts regulatory agencies, especially the DHS, to establish sound criteria that will protect public health. To establish such criteria, it is necessary to identify the constituents of health concern that might be present in recycled water, to determine the pathways of human contact, to determine the mechanisms for reducing harmful constituents through treatment, and to calculate the relative health risk.

Four water quality factors are of particular concern: (1) microbiological quality, (2) total mineral content (e.g., total dissolved solids), (3) presence of toxicants of the heavy metal type, and (4) the concentration of stable organic substances. Particularly for the last two categories, recent studies in environmental toxicology and pharmacology have revealed potential long-term health risks associated with chemical compounds such as disinfection byproducts (DBPs) such as N-nitrosodimethyl amine (NDMA), pharmaceutically active compounds (PhACs), pesticides, and personal care products (PCPs) at low concentrations (orders of ppb and ppt). Those trace organic compounds along with some inorganic compounds such as arsenic and hexavalent chromium found in recycled water are of special concern for human and ecological health risk. In addition, there are growing concerns with those trace contaminants in recycled water, which were coincided with increasingly sensitive detection techniques that enabled detection of extremely low contaminant concentrations.

As we expand indirect potable reuse, public concerns increase as well as the uncertainties in our ability to quantify all of the factors. Even with nonpotable uses, some pathogens have become of increasing concern. It is necessary to keep abreast of new chemicals and pathogens of emerging concern to ensure that existing water recycling practices and regulations are continuing to adequately protect public health. In addition, any efforts to introduce new uses of recycled water or changed practices should be based on sound scientific evidence.

6.1. Research Funding

Issue

Public concerns and perceptions on drinking water safety are a challenge for any water agency. Groundwater recharge with recycled water and indirect potable water reuse in general share many of the public health concerns encountered in drinking water withdrawn from polluted rivers and reservoirs.

Continued innovative research in the broad scientific foundations of water recycling and reuse is needed to establish and improve the broad scientific understanding of water reuse in the context of California's sustainable water supply, wastewater generation and disposal, and environmental impact associated with increasing population growth and urbanization. Research needs to address the four water quality factors described in the introduction of this section, technology for treatment and monitoring, mechanisms of human exposure, and assessment of health risk.

Recommendation 6.1.1. Expand funding sources to include sustained State funding for research on cost-effective treatment, testing and monitoring methods, development of innovative/emerging technologies, study of emerging issues and fundamental scientific principles addressing technology, and public and environmental health related to water reuse.

Approach and Implementation: The Legislature should pass a bond allocating funds for sustainable State funding for research to DWR or through existing or new mechanisms. In return, DWR should work with academic and research institutions on water resources relevant to water recycling issues. This includes feasibility studies, biophysical, engineering, economical, and social research issues. Time frame: July-December 2003. (See recommendation 1.5.1, Chapter 5.)

6.2. University Academic Program for Water Recycling

Issue

It is critical for California to thoroughly assess the best way to manage its water supplies mix and make the best use of recycled water to augment the increasing demand on the limited available freshwater. In addition, water recycling issues cross academic disciplines from water resources to groundwater hydrology to environmental toxicology. There is a need to have an integrated and comprehensive academic program addressing all relevant aspects of water recycling in the context of water resources management. This can be achieved by strong academic and research programs to include a water resources and water recycling curriculum for student development and a collaborative research program with a core of faculty with different expertise and approaches to study water recycling issues. Such academic cores can attract faculty and students to pursue water recycling as an area of interest, producing a steady supply of highly trained professionals and a venue within California for fundamental and applied research in this field. Water recycling is too limited a discipline to expect that every university will be able to support a comprehensive curriculum and research program on water recycling. Water recycling tends to be an offshoot of other disciplines. To develop a comprehensive water recycling academic program, it is necessary to interest a variety of faculty to devote some of their research and teaching time to water recycling. Effort should be made to develop such a core program on at least one California campus.

Recommendation 6.2.1. Encourage an integrated academic program on one or more campuses for water recycling research and education, which is expected to generate well-educated practitioners on water recycling production, quality, and use, using State research funds as an incentive.

Approach and Implementation: The Legislature should pass a bond allocating funds for a sustainable State funding for research to DWR or through existing or new mechanisms. A portion of research funds should be channeled to integrated academic programs to foster water recycling as an academic specialty for both research and teaching. Time frame: July-December 2003. (See recommendation 1.5.1, Chapter 5.)

Chapter 5

Additional Important Recommendations

In addition to the key recommendations set forth in Chapter 4, the Task Force has adopted additional recommendations that will also enhance our ability to implement water recycling projects. These additional recommendations are presented in this chapter organized under the same six issue areas described in Chapter 4. While considered less important than the previous set of recommendations, they nevertheless are feasible to implement and in some cases are essential to address specific types of projects. The numbering of issues continues from the previous chapter.

1. Funding for Water Recycling

1.2. Funding Coordination

Issue

Different funding agencies often lack coordination of their efforts so as to maximize benefits and prioritize funding.

Recommendation 1.2.1. Develop a revised funding procedure to provide local agencies with assistance in potential State and federal funding opportunities. Assistance and guidance would be provided to such agencies as follows:

- (a) The SWRCB would facilitate a newly established Water Recycling Funding Coordination Committee (Committee) to coordinate applicant's funding needs with the appropriate funding agencies. The Committee would guide the local agency through the identification of (1) Correct funding source(s), (2) Accountability measures and (3) Monitoring and assessment reporting requirements.
- (b) The Committee would establish quantifiable objectives to be used in the review of a proposed project. Objectives should include 1) the local, regional, and State benefits, and; 2) non-water supply benefits, resulting from the project. When reviewing proposed projects, the Committee would recommend modifications to maximize the benefit to the State's water supply.
- (c) The Committee would work cooperatively with funding agencies, streamlining project selection while ensuring an open process for setting selection criteria. Peer review and public review of the project selection would also be provided. The Committee would work to ensure that projects have an appropriate level of scientific review, and ongoing monitoring and data analysis.
- (d) The Committee should maintain a listing of local, State and federally funded projects. The list should include detailed project cost and water supply yield information.

Approach and Implementation: The SWRCB should facilitate the establishment of a Committee to implement the recommendation above. Members of the Committee would include representatives from the SWRCB, DWR, USBR, CALFED, the California Water Reuse Association and other stakeholders. The committee would coordinate with the CALFED Bay-Delta Program, which is dedicated to accelerating the implementation of cost-effective actions to conserve and recycle water throughout the State as articulated in its August 2000 Record of Decision. Time frame: January 2004 - ongoing

1.3. Regional Planning Criterion

Issue

Funding for water recycling projects could be more beneficial when regional planning is taken into consideration.

Recommendation 1.3.1. State funding agencies should use information from completed regional studies when determining the prioritization of funding, for those projects encompassed under an existing regional plan. The process does not exclude projects where regional plans do not exist.

Approach and Implementation: State funding agencies including SWRCB, DWR and DHS should use available information from completed studies as a basis to prioritize funding.

Time frame: January 2004 - ongoing

1.4. Funding Information Outreach

Issue

Potential applicants for funding encounter difficulties in finding information on funding sources and understanding their procedures.

Recommendation 1.4.1. Public information to support education and outreach efforts should be provided by having funding agencies:

- (a) present public funding availability at statewide conferences,
- (b) establishing an Annual Water Recycling Funding Information Workshop to assist participants in preparing funding application packages for all funding sources (Federal and State) available, and
- (c) one common website.

Approach and Implementation: The SWRCB should be in charge of setting up and maintaining a common water recycling website that would direct potential applicants and include information on funding sources and procedures. The website should go on line no later than June 2004.

SWRCB should organize annual water recycling information workshops to assist funding applicants in preparing their application packages. In addition, SWRCB should present funding information availability at statewide conferences. Time frame: September 2003 and ongoing thereafter.

1.5. Department of Water Resources Technical Assistance

Issue

For successful water recycling projects, there is a great need for technical assistance in terms of local and regional planning as well as the study of emerging issues and the exploration of new technologies.

Recommendation 1.5.1. Funding sources should be expanded to include sustainable State funding (research funding to DWR only) for DWR's technical assistance and research, including flexibility to work on local and regional planning process, on-going studies of emerging issues, and new technology.

Approach and Implementation: The Legislature should pass a bond allocating funds for a sustainable State funding for DWR technical assistance for water recycling. This includes feasibility studies, research and development, pilot testing, technology development and the study of emerging issues. Time frame: July-December 2003.

1.6. Project Performance Analysis

Issue

There is a lack of a comprehensive cost/benefit analysis of past water recycling projects. Such information is crucial for future planning and projections.

Recommendation 1.6.1. Funding agencies should be provided with the resources to perform comprehensive analyses of performance of existing water recycling projects. The analyses should include determination of actual costs and benefits, and recycled water deliveries. The funding agencies should conduct these analyses jointly in an open and peer-reviewed process. These analyses should quantify recycled water yield in acre-feet per year and compare actual yield with planned yield. The analyses should list other benefits of recycling (such as water supply reliability), and where possible to quantify these benefits. They also should provide costs in equivalent units such as equivalent annual cost.

Approach and Implementation: The Legislature should pass a bond to fund a comprehensive analysis to determine the performance (cost and benefits) of past water recycling activities and project future performance. Funds would be administered by the SWRCB. Time frame: July-December 2003.

2. Public Dialogue / Public Education and Outreach

(There are no additional recommendations beyond those listed in Chapter 4.)

3. Plumbing Code/Cross-connection Control

3.3. Recycled Water Symbol Code Change

Issue

The Department of Housing and Community Development (HDC) initiated amendments to the California Plumbing Code, Sections 601.2.2 and 601.2.3, which covers recycled water systems within HDC controlled occupancies (hotels, apartment houses, employee housing, accessory buildings in mobile home parks, etc.). The Code amendments require that "A universal poison symbol of skull and crossbones shall be provided." The Statement of Reasons for these sections states "... to provide additional measures to protect the health and safety of the public...."

The plumbing code already requires labeling of recycled water piping. The marking requirements for recycled water are continuous along the piping.

The skull and crossbones requirement is perhaps intended to supply a non-English indication that the contents of the pipe are not suitable for ingestion. There is a symbol in the Water Recycling Criteria (CCR Title 22, Section 60310(g)) that can be used to indicate that water is not safe for consumption yet not alarm the public.

The quality of recycled water required for use within buildings of the type controlled by HCD (CCR Title 22, Sections 60306 and 60307) is also considered safe for uses such as park and playground irrigation, truck crop irrigation, and swimming – uses where some ingestion is expected. The anticipated ingestion exposure for swimming is 100 mL and the expected risk of illness when swimming in this quality recycled water is approximately 1 in 10,000. It is misleading to suggest that recycled water is a poison.

Recommendations 3.3.1. Housing and Community Development Department should submit a code change to remove the requirement for the skull and crossbones symbol in Sections 601.2.2 and 601.2.3 of the California Plumbing Code.

Approach and Implementation: DWR and DHS should request Housing and Community Development Department to initiate the change in time for the California Building Commission's 2004 annual code cycle.

3.4. Stakeholder Review of Proposed Cross-connection Control Regulations

Issue

DHS is drafting proposed changes to the cross-connection control regulations. There are concerns with the proposed requirements in the working draft of revisions. There would be a requirement for a double check valve on fire systems supplied by the potable water system where recycled water is used in a separate piping system within the same building. This requirement would make it difficult or impossible to retrofit a building with an existing fire system. The double check assembly would cause a pressure drop of approximately 10 psi. This might be enough to compromise the performance of a fire system that has not been designed for the head loss. Fire systems may not be engineered to exactly fit a building of site specification and it may be that a fire system can absorb a 10 psi drop without compromising the system. New systems can be designed to address the pressure drop.

Another issue to resolve is a conflict between the current Title 17 requirements and the California Plumbing Code. The California Fire Marshall is opposed to backflow devices on Class I and II fire systems and has amended Sections 603.4.18 and 603.4.19 of the 2001 California Plumbing Code to prohibit the installation of these devices.

Recommendation 3.4.1. Stakeholders are encouraged to review the DHS draft changes of the Title 17 Cross-connection Control requirements and comment as appropriate.

Approach and Implementation: DHS should carry out this recommendation beginning July 2004.

3.5. Cross-Connection Risk Assessment

Issue

Despite a long history of water reuse in California, the question of *safety* of water reuse is still difficult to define and delineation of *acceptable* health risks has been hotly debated. Health risks associated with exposure to enteric viruses in recycled water were analyzed using a quantitative microbial risk assessment approach in 1990s. Monitoring data from four wastewater treatment facilities in California on enteric virus concentrations in unchlorinated secondary effluents were used as baseline data for the risk analysis. This assessment needs to be expanded and refined.

Recommendation 3.5.1. The State should support a thorough assessment of the risk associated with cross-connections between disinfected tertiary recycled water and potable water. To assess potential health risks associated with the use of recycled water in various reuse applications, new comprehensive risk assessment should be carried to identify:

- the risk of a worst case cross-connection,
- the likelihood of a cross-connection in various use situations, and
- microbiological and chemical exposure risks.

The risk assessment would provide a scientific basis for regulations controlling potential cross-connections.

Approach and Implementation: DHS in collaboration with other State and federal agencies and research institutions should carry out this recommendation beginning July 2004.

4. Regulations and permitting

4.5. Permitting Procedures

Issue

As a minimum, each recycled water distribution system must have at least one permit from a RWQCB. The permit must incorporate statewide standards adopted by DHS and may include other recommendations by DHS protective of public health. All new projects or additions are required to submit engineering reports for DHS review. Some agencies have found the procedures of DHS and the RWQCBs to be lengthy and cumbersome. There may be opportunities to streamline these procedures. Aspects of this issue that have been suggested for consideration are 1) investigation of the timing of permits vis-à-vis the CEQA process, 2) the permitting of seasonal storage, and 3) the development of a one-stop approach to permitting. There is an overlap in the permitting issues and the uniform interpretation of State standards issue addressed in the previous chapter. After analysis of the issue, the Task Force makes the following recommendations in addition to those captured in under the uniform interpretation of State standards issue.

Recommendation 4.5.1. DHS should continue to maintain and update its “California Health Laws Related to Recycled Water—The Purple Book,” which is an excellent resource for the permit requirements related to recycled water projects.

Approach and Implementation: The Purple Book, named after the standard color used for recycled water piping, is an effective resource. Often such resources are left to languish by their creators. The Task Force recognizes this useful document and urges its maintenance and encourages its greater accessibility by improving the DHS Web site to be able to find it. Time frame: July 2003-on-going thereafter.

Recommendation 4.5.2. Association of California Water Agencies and California Association of Sanitation Agencies should clarify for their members: under what circumstances water and wastewater agencies must seek permits from local land use and building authorities for recycled water projects.

Approach and Implementation: In addition to State permits, there may be local permits required for the construction of water recycling facilities. There has been confusion on the part of project sponsors and local permitting authorities regarding when it is appropriate to require or obtain such permits. It would be a service for the water recycling agencies if the associations representing water and wastewater agencies to clarify the circumstances such permits are required. Time frame: July-December 2003.

Recommendation 4.5.3. DHS should clarify the requirements for engineering reports to cover multiple sites of similar use.

Approach and Implementation: An increasing number of recycled water projects involve distribution systems with dozens or hundreds of individual sites and continual additions of new customers as the systems expand. While DHS review is important to protect public health, the production of formal engineering reports for each site and each new addition can be cumbersome when the issues related to the sites have already been addressed for previous sites of similar use. DHS should clarify the requirements for engineering reports and the formats for them that would reduce the work in their preparation when multiple sites of similar use are involved. Time frame: January-March 2004.

Recommendation 4.5.4. State and local tax incentives should be provided to recycled water users to help offset the permitting and reporting costs associated with the use of recycled water.

Approach and Implementation: Recycled water users may incur additional costs for using recycled water instead of potable water. For example, separate plumbing systems must be installed to deliver two sources of water. The users may also be required to keep logs of all repair and maintenance activities on the recycled water piping systems to verify that cross-connections have not occurred. Many agencies provide a financial incentive to use recycled water by selling the recycled water at a lower price than potable water, sometimes using potable water revenue to subsidize the recycled water system costs. Another mechanism could be providing tax incentives to users. The

Legislature should consider tax incentives to offset costs incurred by users of recycled water. Local agencies should consider tax or other financial incentives to offset costs incurred by users of recycled water. Time frame: July 2003 and on-going thereafter.

4.6 Source Control

Issue

Recommendation 4.6.1. Local agencies should maintain strong source control programs to protect the quality of recycled water for potential uses and protect public health.

Approach and Implementation: Source water/wastewater quality is a significant potential impediment to the expansion of recycled water usage in California. While it can be resolved through technology and management, the costs both monetarily and to public perception of recycled water can be expensive. Local agencies promoting water recycling must be aware of the potential presence of chemicals in recycled water and the potential public perception of what might be in the water. Thus, they must ensure that there is a strong source control program in place to maintain public confidence in the safety of water recycling projects. Time frame: July 2003 and on-going thereafter.

5. Economics

5.2. Economic Analysis

Issue

A project may be economically feasible, but not financially feasible and vice versa. Economic analyses provide more transparency on true benefits and costs and increase the probability of identifying project beneficiaries that can make the project more financially feasible and economically justified. Often project feasibility studies overlook economic analyses and focus on financial analyses.

Recommendation 5.2.1. Local agencies are encouraged to perform economic analyses (quantifying total benefits and costs) of water recycling projects in addition to financial analyses (to determine cash flow) even if they are not seeking State or federal funding.

Approach and Implementation: Agencies need to include such analysis in their feasibility studies once a guidebook on conducting economic feasibility analysis is developed pursuant to Recommendation 5.1.1 (e) Time frame: January 2004 - ongoing.

Recommendation 5.2.2. A financial and an economic analysis should be included as two of the funding criteria in State and federal funding programs. Projects proposed for funding should be financially feasible (sufficient cash flow to pay for and maintain the project) and economically feasible (total statewide project benefits exceed total statewide project costs). The funding agencies should provide guidance and assistance for all funding applicants to conduct the analyses; and review the analyses in applications to ensure they are done appropriately and consistently. These analyses need not duplicate appropriate analyses already performed by local agencies.

Approach and Implementation: A revised funding procedure as required by Recommendation 1.2.1 needs to include a requirement that agencies applying for public funds submit a financial and an economic analysis to be eligible to receive funding. Time frame: January 2004 - ongoing.

6. Science and health/indirect potable reuse

6.3. Statewide Science-based Panel on Indirect Potable Reuse

Issue

After extensive discussions and deliberation on this issue, recommendation was made not to reconvene the California Indirect Potable Reuse Committee. The State of California Department of Health Services should be able to make informed and scientific determinations on issues related to indirect potable reuse based on the following publications.

- “Report of the Scientific Advisory Panel on Groundwater Recharge with Reclaimed Wastewater”, Prepared for State of California, State Water Resources control Board, Department of Water Resources, and Department of Health Services, November 1987.
- “Issues in Potable Reuse – The viability of augmenting drinking water supplies with reclaimed water”, National Research Council, 1998.
- “ A Proposed Framework for Regulating the Indirect Potable Reuse”, Prepared by The California Potable Reuse Committee, January 1996.
- DHS Draft Groundwater Recharge Regulations (August 2002)

Recommendation 6.3.1. It is recommended not to reconvene the statewide science-based panel to address indirect potable reuse. However, it is recommended to convene a new statewide panel to address issues related to indirect potable reuse as presented in recommendation 2.2.6.

Approach and Implementation: The proposed panel on indirect potable reuse is described in Recommendation 2.2.6.

Chapter 6

Summary and Implementation

While the Recycled Water Task Force has identified numerous obstacles and impediments to water recycling in California, it has also found that California has exhibited overall support for water recycling and has in place a very effective regulatory environment to ensure the safe use of recycled water and still allow use at over 4,000 farms, parks, golf courses, commercial and industrial enterprises, and other sites. In most cases, significant obstacles are not present or may be overcome in the inevitable process of integrating the multitude of interests into the planning process for projects.

The emphasis is to improve the way all levels of government function and assist each other and the public to enhance the ability for cost-effective and safe projects to proceed and help satisfy the growing demand for water in California. The Task Force focused its attention on the issues and solutions that it thought would make the most difference and could be effectively implemented. The recommendations of the Task Force have been discussed in the previous two chapters and are analyzed in more depth in the white papers of the six workgroups of the Task Force. They are summarized in Table 4.

As can be seen from the table, if we are to remove the obstacles to water recycling, virtually every entity involved in water recycling activities has a role to play in implementing the recommendations. The time frames for implementation are believed to be realistic, but many factors and priorities of the various entities will come into play that the Task Force could not assess. It is important, however, that the recommendations not be displaced by other priorities and then forgotten. The various agencies need to display their commitment to fulfill these recommendations, even if they need to firmly establish their own timetables.

The fulfillment of the recommendations requires resources and a will to take action. In many cases they call upon all levels of government, including local agencies, to take a different attitude and approach in the conduct of their missions and the development of projects. There is a need for greater willingness to listen to alternative viewpoints and concerns, whether they come from the public or recycled water customers or from other governmental agencies. There is also the need for greater effort to ensure the legal soundness of governmental decisions and to communicate them effectively and respectfully. The three primary agencies involved in assisting this Task Force, DWR, SWRCB, and DHS, should continue their collaboration to insure a timely implementation of the recommendations. It is expected that with DWR taking a leadership role, the other agencies would assign staff to assist in seeing the recommendations reach fruition.

There is tremendous potential for increased use of recycled water in California. The Task Force is grateful for the opportunity to assist the State in fulfilling this potential.

Table 4. Task Force Summary Recommendations

Recommendation	Implementing Agency	Time Frame
{1.1} Increase State and federal funding for reuse/recycling beyond current sources.		
1. State funding for reuse/recycling should be increased beyond Proposition 50 and other current sources.	Leg./SWRCB	Jul.-Dec. 03
2. The California Water Commission, in cooperation with DWR and SWRCB, is strongly encouraged to seek federal cost sharing legislation for water recycling.	CWC/ DWR/ SWRCB	Jul.03-ongoing
{2.1} Engage the public in an active dialogue using a community value-based decision-making model in planning water recycling projects.		
1. Increase public participation through vigorous outreach, augmenting the notification requirements stipulated by CEQA and NEPA.	SWRCB/DWR	Jul.03 – ongoing
	BDPAC	Jan.04 – Jan.05
	Local agencies	Jul.03-ongoing
2. Hold more public meetings to gather and supply information at appropriate venues.		
3. Make project decisions that respect and incorporate the community's values and concerns (considering growth, coordination with local planning, environmental justice issues, et cetera).		
4. Convene an independent advisory committee composed of experts in the field and consumers from a variety of viewpoints who have no vested interest to review the proposed project alternatives, its implementation and operation where needed.	Local agencies	Jul.03-ongoing
5. Educate and consider with the public all the alternatives for locally achieving water supply goals.		
6. Local Agencies cultivate and utilize the media opportunities for their projects.		

Recommendation	Implementing Agency	Time Frame
{2.2} Establish Leadership support for water recycling to include convening a statewide panel to address issues related to indirect potable reuse.		
<u>State Support</u>		
1. Take a leadership role on water recycling		
i. Develop a common language of referring to recycled water treatment levels and uses to improve public discussions.	Leg./DHS	Fall 03-Jul.04
ii. Set a standard signage for regulatory use which increases the public's understanding of recycled water.	Leg./DHS	Fall 03-Jul.04
iii. Develop a consistent position on water recycling.		
iv. Convey its mission to maximize recycled water use throughout all government levels via interagency collaboration.	DWR/SWRCB/ DHS	Sep.03-Jan.05
v. Facilitate projects and communicate the rules clearly to local health offices.		
vi. Encourage recycled water use by using it in public agency buildings to flush toilets, and to irrigate city parks.	State/local gov.	Jul.03-ongoing
2. Provide funding for public education and outreach.	State/local gov.	Jul.03-ongoing
3. Work closely with local agencies on water recycling to include: technical assistance, greater education and clarification on recycled water use policy, coordination of existing and new recycled water informational programs.	DWR/SWRCB/ DHS	Jul.05-ongoing
<u>Local Government Support</u>		
4. Appropriate local agencies should adopt well-defined local recycled water ordinances.	Local Gov.	Jul.03-ongoing
<u>Regulatory Agencies Support</u>		
5. Building inspectors, code enforcement officers, etc., should effectively enforce the installation of types of plumbing that would allow the use of recycled water in accordance with local recycled water ordinances.	Local Gov.	Jul.03-ongoing
6. Convene a statewide independent review panel on indirect potable reuse to ensure adequate health and safety assurance for California residents.	CBDA	Jan.04-Jul.05

Recommendation	Implementing Agency	Time Frame
{2.3} Convene a Statewide panel to recommend changes to public schools and higher education curriculum.		
1. Develop a comprehensive water education curriculum for each grade (K-12) which incorporates recycled water in the Content Standards for California Public Schools: science standards and/or the history-social science standards.	Board of Ed.	Jul.03-Jan-07
2. Approach institutions of higher education to incorporate recycled water education into their curriculum.	DWR/UC/CSU	Jul.03-
3. Enhance existing programs, for example those offered through the Water Education Foundation, or other organizations.	DWR	Jul.04-
{2.4} Adopt a State-sponsored media campaign to increase public awareness and knowledge of recycled water:		
1. Develop a water issues information program for radio, television, and print.	State Agencies	Jul.04-ongoing
2. Work with organizations that have produced videos on water issues, including recycled water, and fund updates and expanded programming and encourage cable television networks to broadcast these videos regularly throughout the State.	State Agencies	Jul.05-ongoing
3. Prepare op ed pieces for publication in newspapers throughout the State.	State/Local	Jul.04-ongoing
4. Retain an advertising agency/public relations firm to assist in the development of short messages with specific information on urgent topics such as drought, conservation, pollution prevention, water quality, stormwater, wastewater, or recycled water including indirect potable reuse. (Emphasis should be inclusive of the locales' diversity).	State Agencies	Jul.04-ongoing
{3.1} California should adopt its own Appendix J of the Uniform Plumbing Code in order to avoid the inconsistencies between the IAPMO version and other California regulations.		
Encourage adoption by the Department of Water Resources of the recommended version of Appendix J (included as Appendix D in this report) at the earliest opportunity.	DWR	Jul.03-Sep.05
{3.2} Prepare DHS guidance to achieve more consistent interpretation of State standards.		
1. DHS guidance should be prepared that would clarify the intent and applicability of Title 22, Article 5. If guidance cannot be written to accomplish this, the regulation should be rewritten.	DHS	Jul.03-Sep.05

Recommendation	Implementing Agency	Time Frame
2. DHS guidance should be prepared that would clarify the requirement for testing in Title 22, Section 60316(a) and stress that alternatives to a pressure test are sufficient in many cases.	DHS	Jul.03-Sep.05
3. DHS should amend Title 22, Article 5 to incorporate inspection and testing requirements consistent with whatever requirements are adopted as part of a California version of Appendix J of the California Plumbing Code, as recommended in Recommendation 3.1.1.	DHS	Jul.03-Sep.05
{4.1.} Health and Safety Regulation -- The Department of Health Services should involve stakeholders in a review of various factors to identify any needs for enhancing existing local and State health regulation associated with the use of recycled water.	DHS	Jul. 03-Jun.04
{4.2.} Investigate, within the current legal framework, alternative approaches to achieve more consistent and less burdensome regulatory mechanisms affecting incidental runoff of recycled water from use sites.		
1. The SWRCB should convene a committee to review the legal requirements of federal and State statutes and regulations that relate to the regulation of incidental runoff and to determine the regulatory and enforcement options that are available to Regional Water Quality Control Boards.	SWRCB	Jul. 03-Jan. 04
{4.3.} Create uniform interpretation of State standards in State and county regulatory programs.		
1. The SWRCB should appoint and empower a key person to provide oversight of the water recycling permits issued by the various regional boards. This person would act as an ombudsman to facilitate recycling and arbitrate conflicts.	SWRCB	Aug.03-ongoing
2. The DHS needs to take steps to ensure the uniform interpretation and application of Water Recycling Criteria in Title 22 of the Code of Regulations and other regulations applicable to water recycling.	DHS	Plan: Jul.-Oct.03 Imp: Nov.03-on
3. Conduct a legal review to determine whether authority exists for local health agencies to adopt water recycling requirements that are more restrictive than those included in Titles 17 and Title 22.	DHS	Jul.03-Oct.03
4. Investigate the water recycling programs in Florida to determine whether there are concepts that should be adopted in California.	SWRCB/DHS WaterReuse	Jan.04-Feb.04
5. The RWQCBs should be more proactive during the planning of recycled water projects so issues can be addressed before design commences.	RWQCB	Jul.03-ongoing
6. Each RWQCB should have a resident expert on water recycling to provide consistency in permitting and coordinate with other RWQCBs in maintaining consistency.	RWQCB	Jul.03-ongoing

Recommendation	Implementing Agency	Time Frame
{4.4} Legislation to increase local flexibility to regulate water softeners.		
1. Local agencies should be empowered to regulate the discharge of residential water softeners in the same manner as other sources of discharge into sewers. Legislation should be proposed to amend the Health and Safety Code Sections 116775 through 116795 to reduce the restrictions on the local ability to impose bans on or more stringent standards for residential water softeners.	Legislature	Jul.03-Dec.03
2. On-going or proposed studies on water softeners should continue to be pursued to develop alternatives for salt reduction in recycled water. Funding should be sought for such studies.	Research related institutions	Jul.03-Sep.03
3. Within the current legal restrictions, local agencies should consider publicity campaigns to educate consumers regarding the impacts of self-regenerative water softeners and promote the use of off-site regeneration by service companies. They should also consider financial incentives to upgrade older inefficient appliances to the current standards.	Local Agencies	Jul.03-ongoing
{5.1} Develop a uniform method for analyzing projects and a consistent economic feasibility framework across funding agencies. This could be accomplished by an advisory team of economists, recycled water experts, and stakeholders.		
a) Identify a set of desirable characteristics for an economic feasibility analysis framework based on true benefits and costs for recycled water projects in California.		
b) Review existing frameworks to find the commonalities and gaps based on the characteristics from a) above; add components to the framework that fill in the gaps.		
c) Develop a practical and implementable process to identify and include non-market benefits and costs into the framework.	DWR / SWRCB / DHS	Sep.03-Aug.04
d) Develop a mechanism to increase the opportunity for identifying equitable capital and operational funding schemes according to the beneficiaries based on allocation of the benefits and costs in the economic analysis.		
e) Develop guidance to conduct an economic feasibility analysis.		
f) Develop a mechanism for information from the economic feasibility analysis to feed into the financial feasibility analysis and funding decision making.		
g) Develop appropriate benchmarks for comparing the incremental costs of developing recycled water with the cost of developing an equivalent amount through fresh water projects.		

Recommendation	Implementing Agency	Time Frame
{6.1} Expand funding sources to include sustainable State funding for research including research on treatment, testing and monitoring methods, development of innovative/emerging technologies, study of emerging issues and fundamental scientific principles addressing technology, public and environmental health.	Leg./DWR	Jul.-Dec. 03
{6.2} Encourage an integrated academic program on one or more campuses for water reuse research and education, which is expected to generate well-educated practitioners on water recycling production, quality, and use.	State	Jul.03-Dec.03
{1.2} Develop a revised funding procedure to provide local agencies with assistance in potential State and federal funding opportunities.		
a) The SWRCB will facilitate a newly established Water Recycling Funding Coordination Committee (Committee) to coordinate applicant's funding needs with the appropriate funding agencies.		
b) The Committee will establish quantifiable objectives to be used in the review of a proposed project. Objectives shall include 1) the local, regional, and State benefits, and; 2) non-water supply benefits, resulting from the project.	SWRCB/DWR/DHS/USBR	Jan.04-ongoing
c) The Committee will work cooperatively with funding agencies, streamlining project selection within one agency while ensuring an open process for setting selection criteria.		
d) The Committee shall maintain a listing of local, State and federally funded projects. The list should include detailed project cost and water supply yield information.		
{1.3} State funding agencies will use information from regional studies to prioritize funding for projects encompassed under a regional plan. The process does not exclude projects where regional plans do not exist.	SWRCB/DWR/DHS/USBR	Jan.04-ongoing
{1.4} Present information on funding availability through workshops, conferences and on the Internet.	SWRCB	Jan.04 - ongoing
{1.5} Expand funding sources to include sustainable State funding for DWR's technical assistance and research, including flexibility to work on local and regional planning, emerging issues, and new technology.	Legislature	Jul.03-Dec.03
{1.6} Provide funding agencies with the resources to perform comprehensive analysis of past recycling performance (costs and benefits) and projection of future performance.	Legislature	Jul.03-Dec.03
{3.3} Housing and Community Development Department should submit a code change to remove the requirement for the skull and crossbones symbol in Sections 601.2.2 and 601.2.3 of the California Plumbing Code. DWR and DHS should request HCD to initiate the change in time for the California Building Commission's 2004 annual code cycle.	DWR/DHS/HCD	2004 Annual Code Cycle Change

Recommendation	Implementing Agency	Time Frame
{3.4} Encourage stakeholders to review the DHS draft changes of the Title 17 Cross-connection Control requirements and comment as appropriate.	DHS	Jul.04-ongoing
{3.5} Support a thorough assessment of the risk associated with cross-connections between disinfected tertiary recycled water and potable water. The risk assessment would provide a scientific basis for regulations controlling potential cross-connections.	DHS	Jul.04-
{4.5} Permitting Procedures		
1. DHS should continue to maintain and update its “California Health Laws Related to Recycled Water - The Purple Book”, which is an excellent resource for the permit requirements related to recycled water projects.	DHS	Jul.03-ongoing
2. ACWA and CASA should clarify for its members: under what circumstances water and wastewater agencies must seek permits from local land use and building authorities for recycled water projects.	ACWA/CASA	Jul.03-Dec.03
3. DHS should clarify the requirements for engineering reports to cover multiple sites of similar use.	DHS	Jan.04-Mar.04
4. State and local tax incentives should be provided to recycled water users to help offset the permitting and reporting costs associated with the use of recycled water.	Legislature and local Agencies	Jul.03-ongoing
{4.6} Maintain strong source control programs and increase public awareness of their importance in reducing pollution and ensuring a safe recycled water supply.	Local Agencies	Jul.03-ongoing
{5.2} Encourage local agencies to perform economic analyses of water recycling projects; and include such analyses as two of the funding criteria in State and federal funding programs.		
1. Local agencies are encouraged to perform economic analyses even if they are not seeking State or federal funding.	Local Agencies	Jan.04-ongoing
2. Include a financial and an economic analysis as two of the funding criteria in State and federal funding programs.	Funding Agencies	Jan.-04-ongoing
{6.3} Recommend not reconvening the statewide science-based panel to address indirect potable reuse.		

APPENDICES

- A. Assembly Bill No. 331
- B. Memorandum of Agreement Between DHS and SWRCB on Use of Reclaimed Water
- C. Compendium of State Laws Regarding Water Recycling
- D. Proposed California Version of Appendix J of the Uniform Plumbing Code
- E. Abbreviations
- F. Glossary
- G. Public Comments